RUBBER and PLASTICS WEEKLY

VOLUME 141 NO. 13 SEPTEMBER 23 1961 ONE SHILLING

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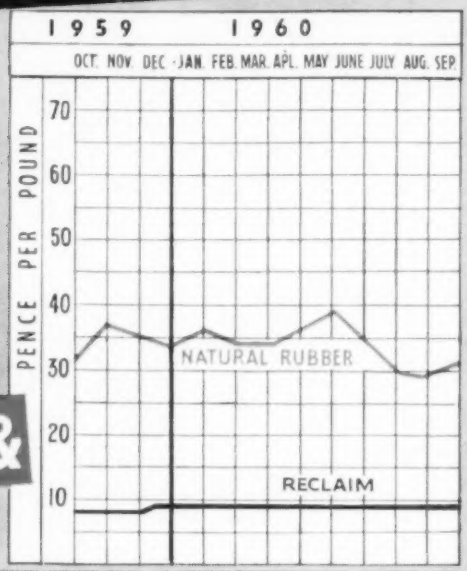
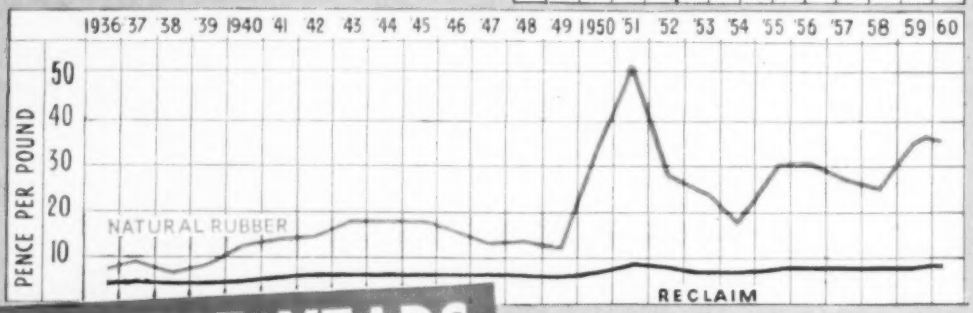


OVER THE MONTHS &



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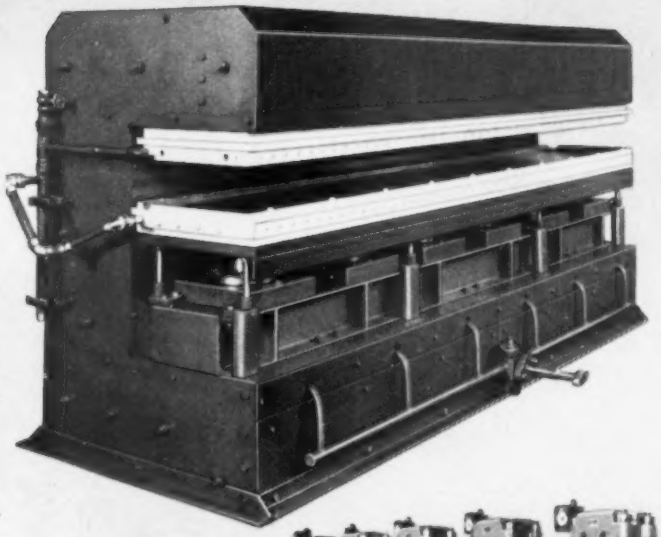

(Above) Model 838. Open-fronted press, one daylight, steam heated. Total pressure 150 tons.

(Below) A self-contained unit comprising six 3 daylight electrically heated 38 ton Model 821 presses complete with hydraulic pump. Each press may be operated independently by its own control valve

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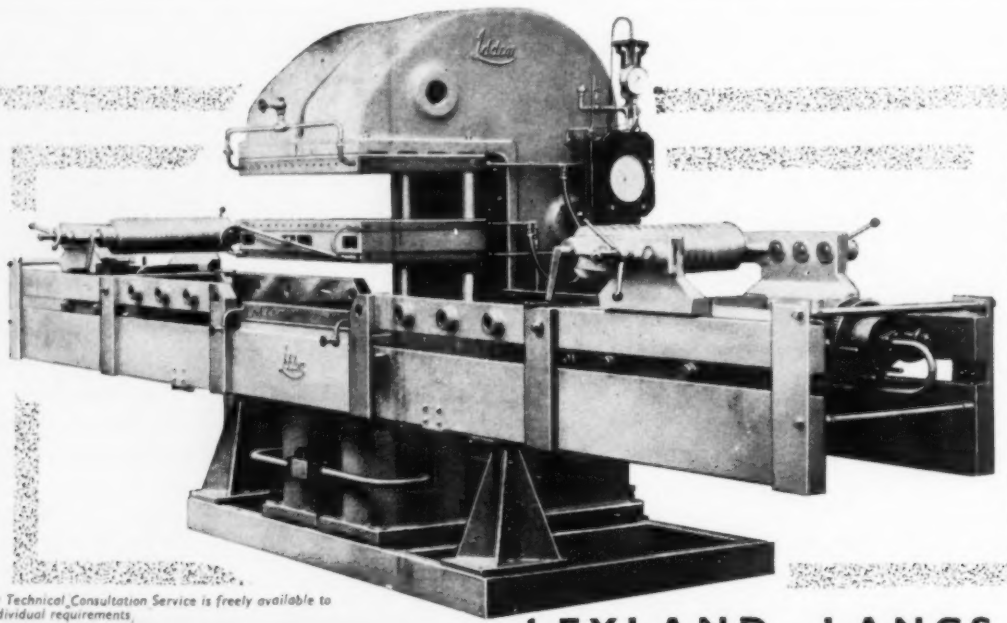

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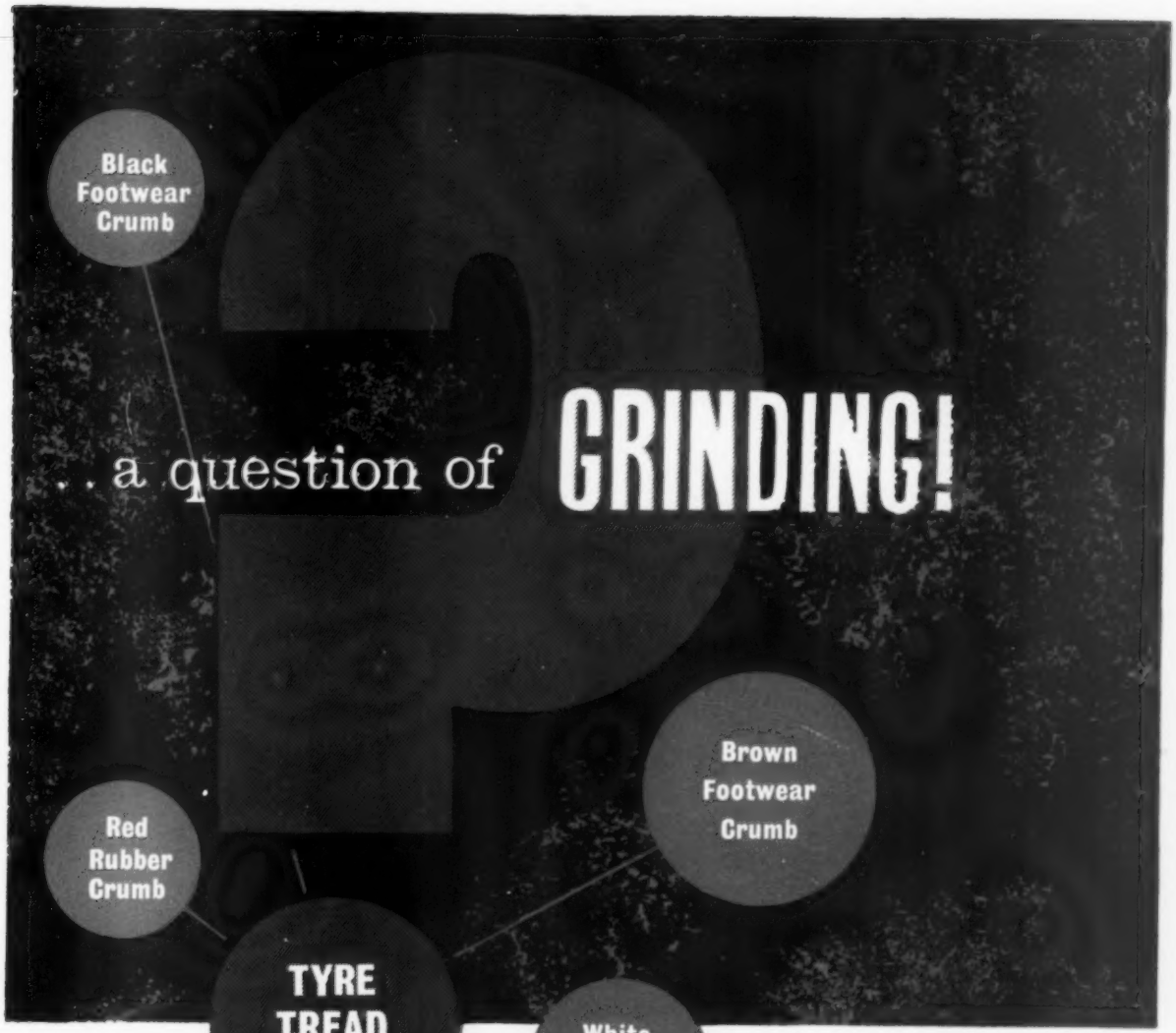

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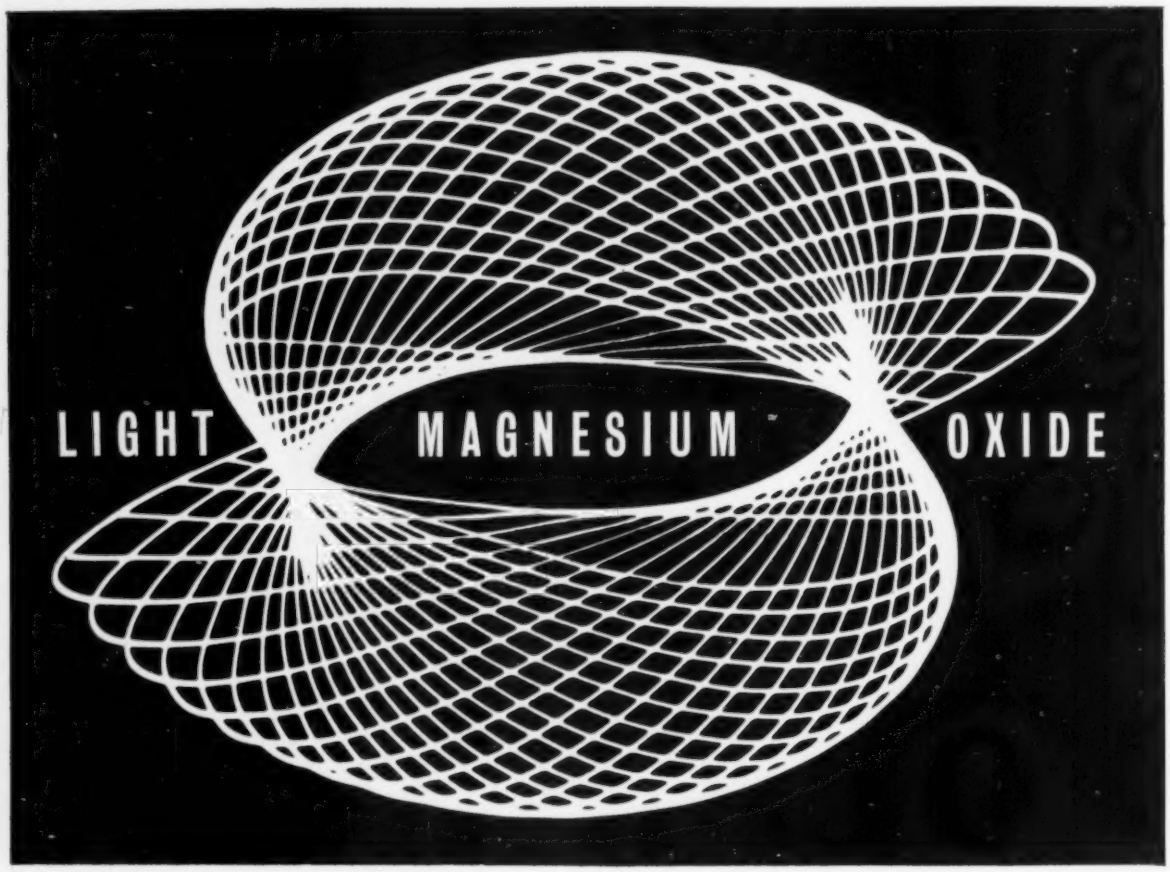

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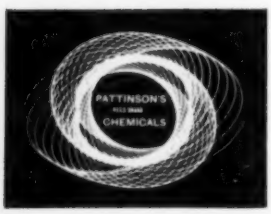

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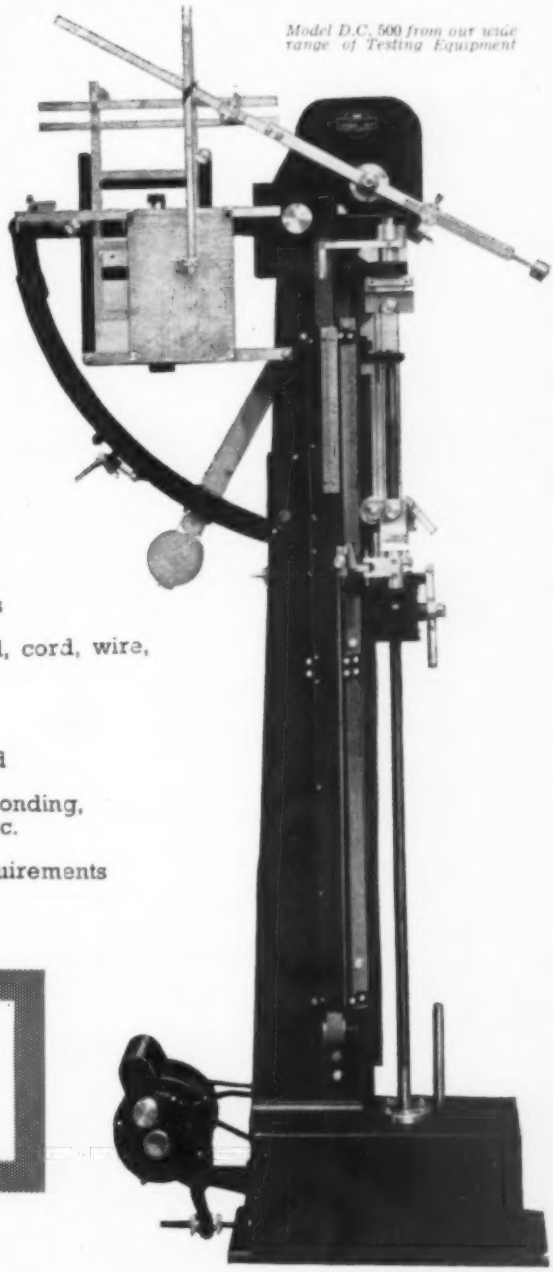

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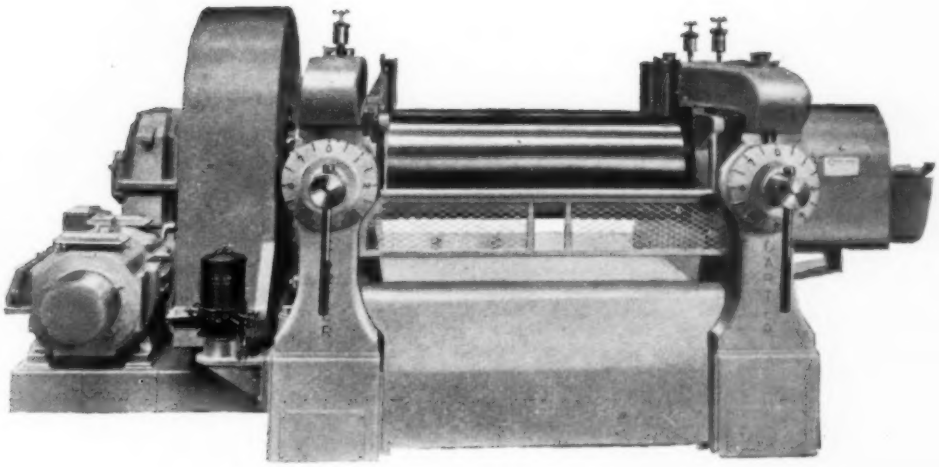

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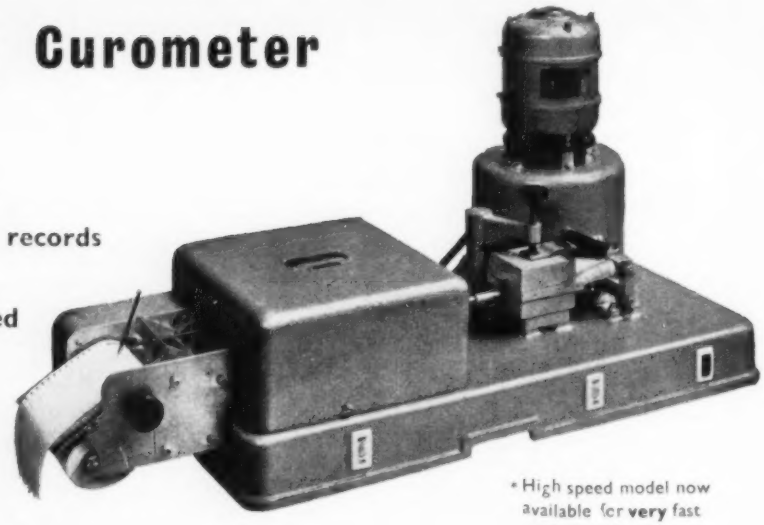

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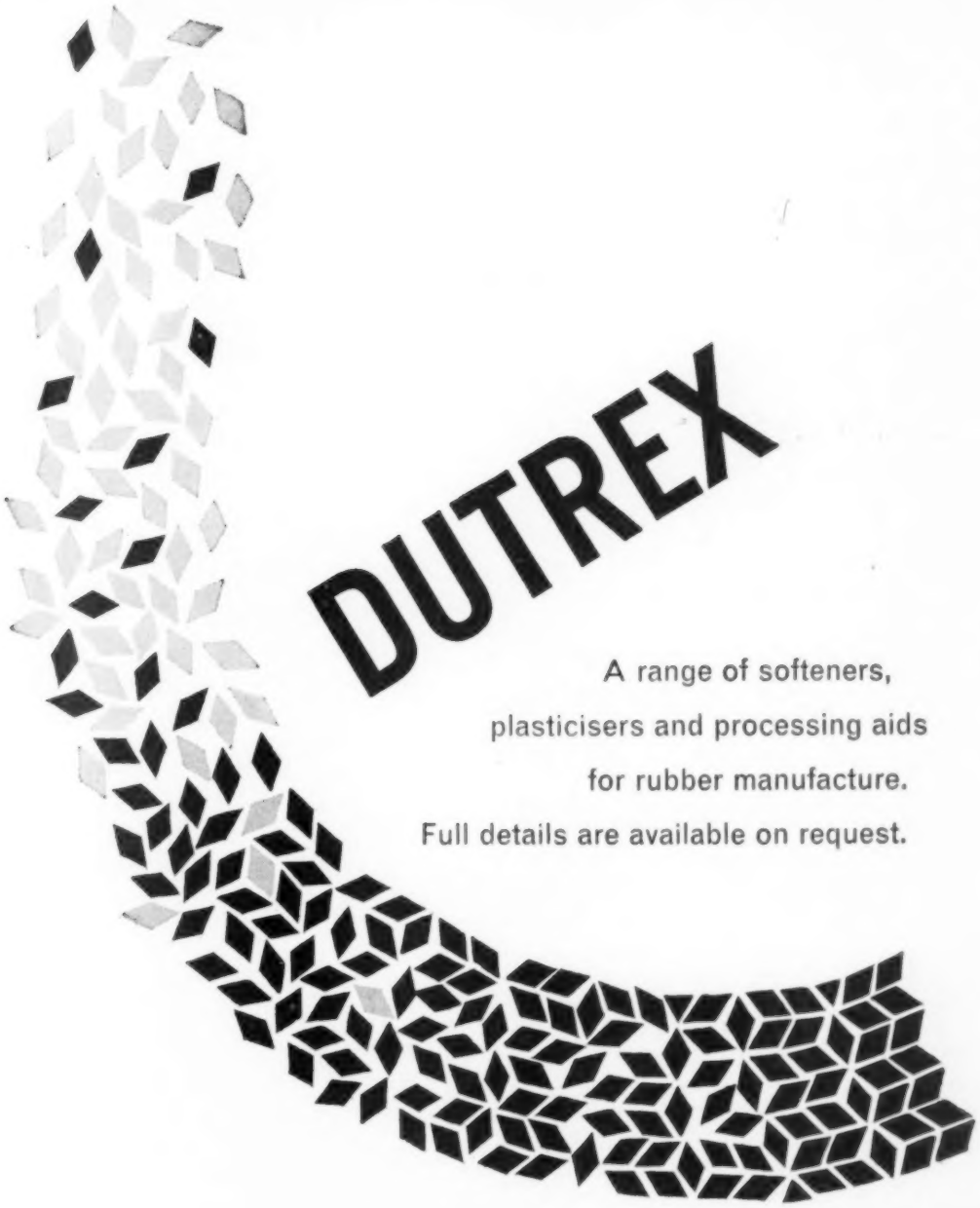

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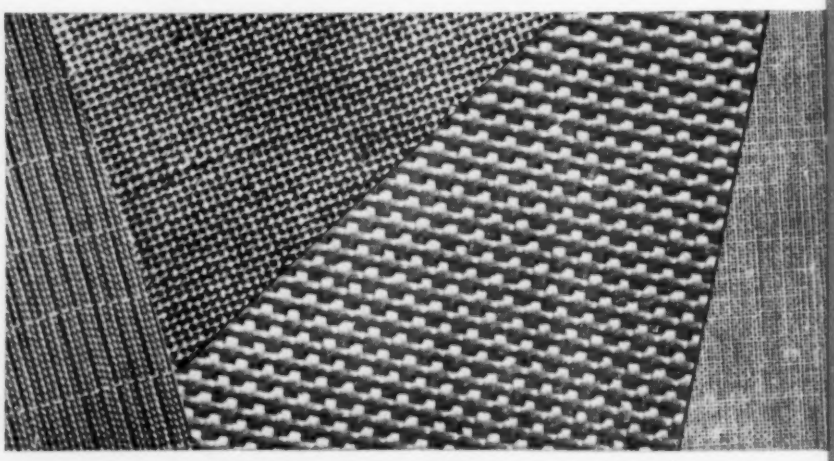

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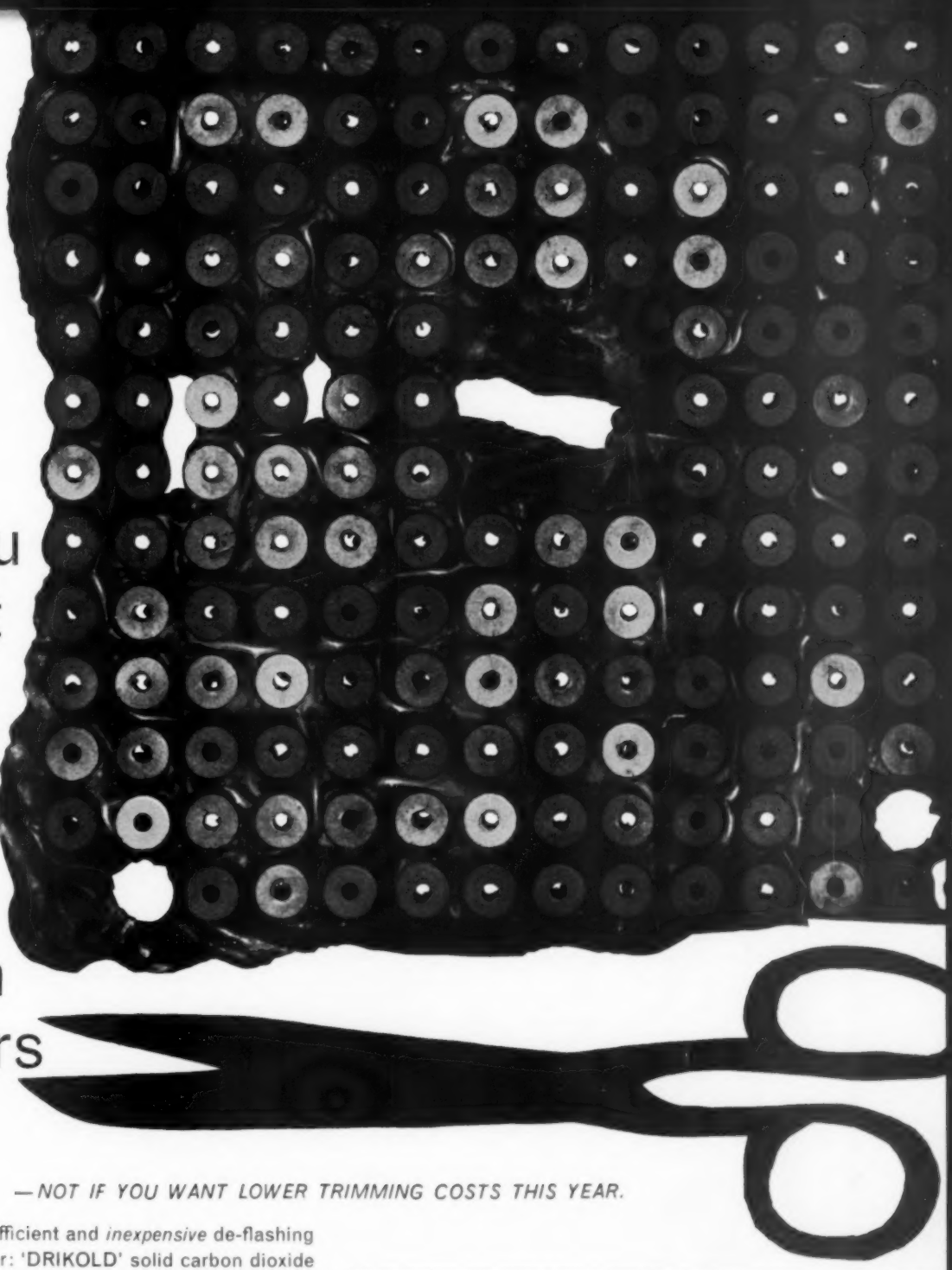

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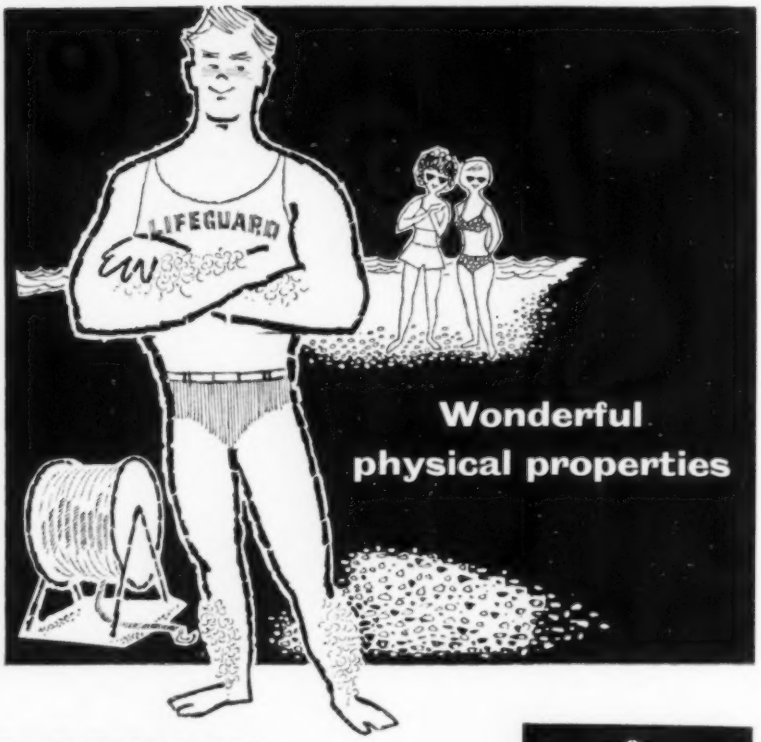

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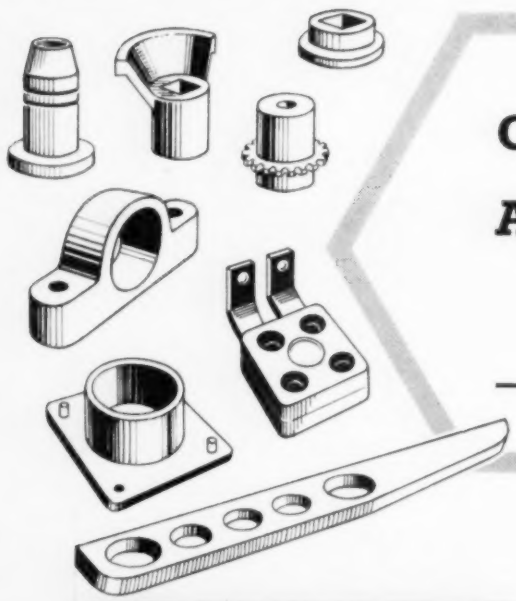

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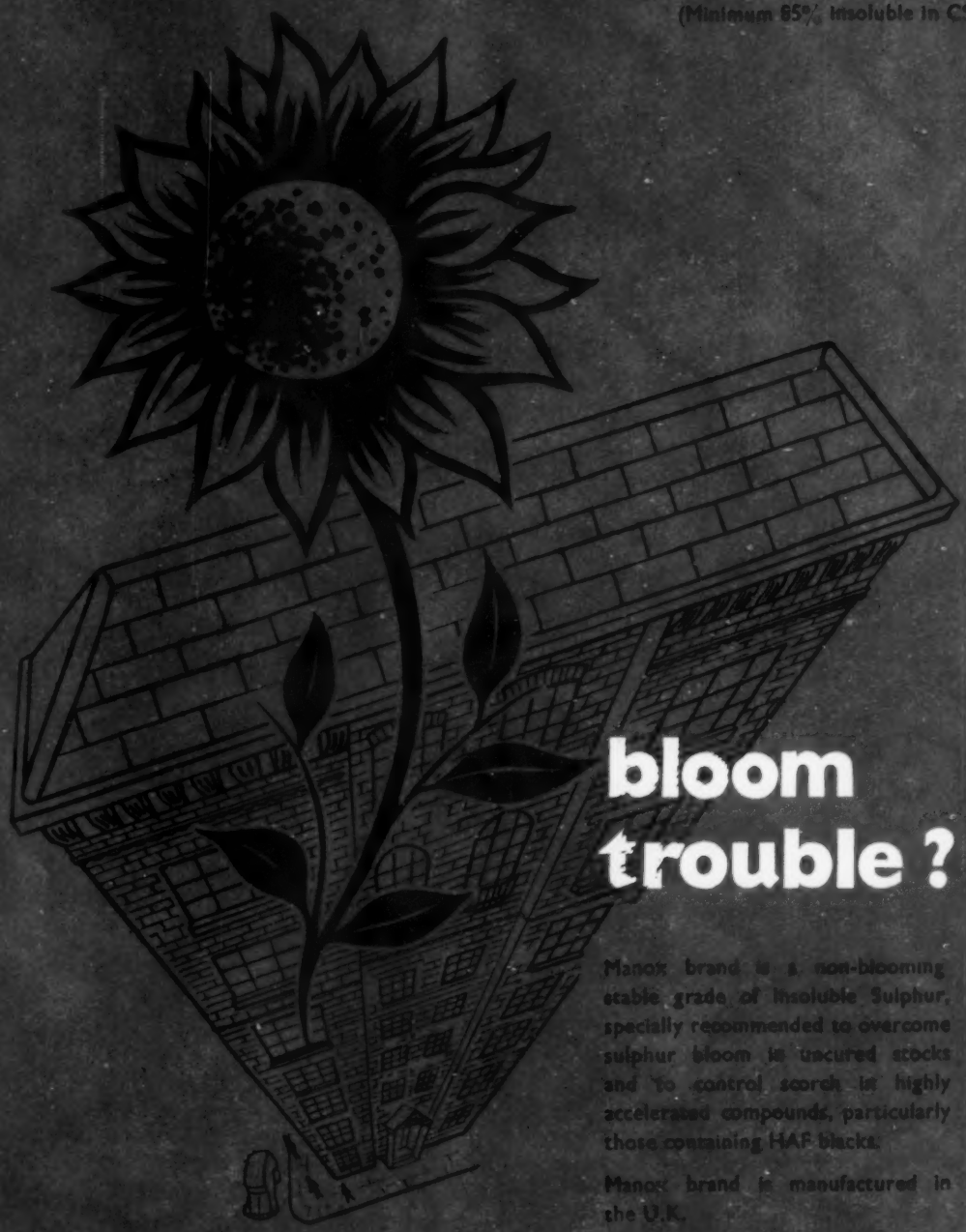

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 141 IN ITS 78th YEAR No. 13

September 23 1961

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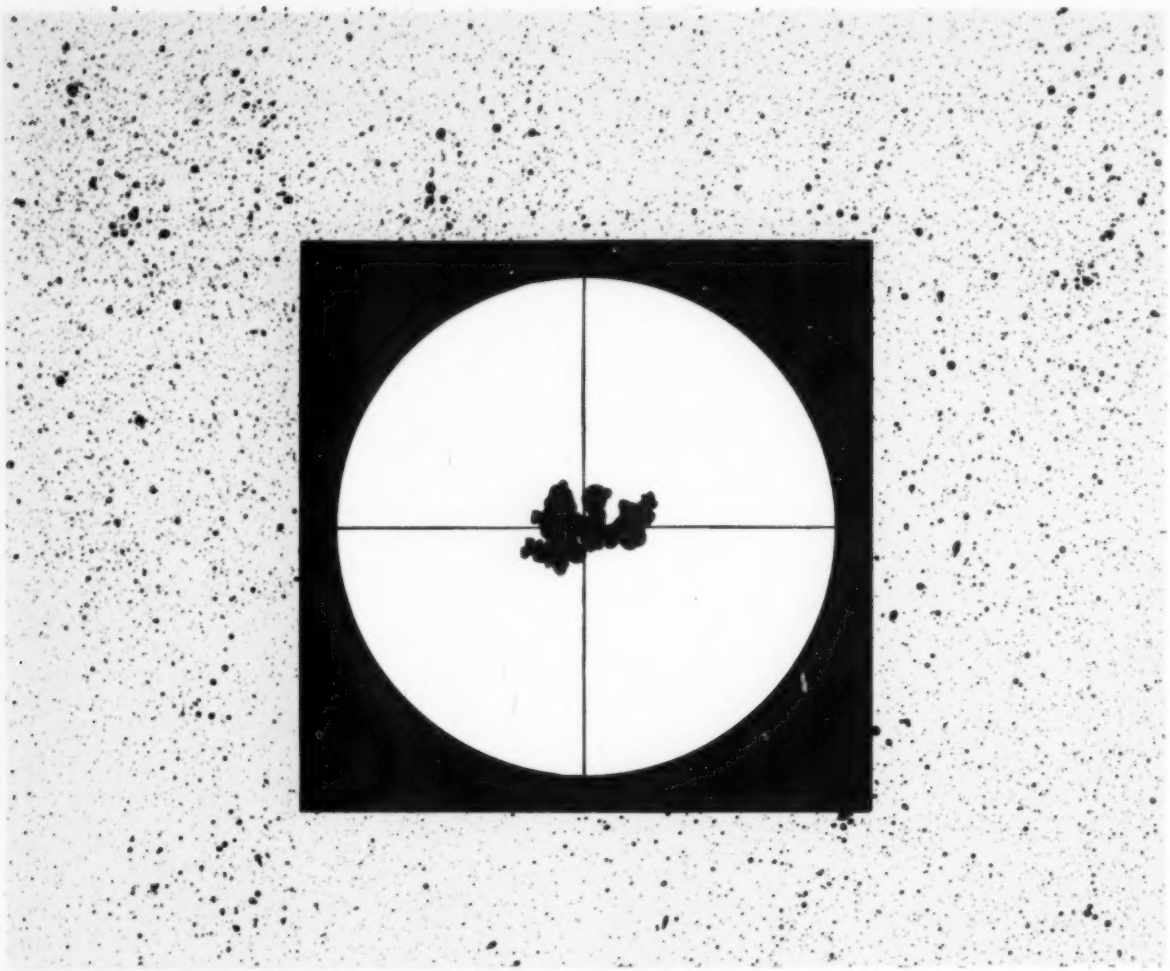

A particle of carbon black – enlarged 50,000 times. No one has calculated *(formidable task!)* the number of particles in the 125,000,000 pounds which can be produced annually by PHILBLACK LIMITED – biggest all-British makers of carbon black.

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NOTES of the WEEK

Quality Control

ALTHOUGH a good deal of pioneer work on quality control was carried out in the UK, a surprisingly large proportion of British industry still fails to recognize its value. It has been estimated that in this country every production worker makes about £200 worth of spoilt work a year (priced at factory costs).

Of course, most firms, however small they are, practice some measure of quality control in the form of a system of inspection. But this can be taken much further. Quality control begins on the drawing board and should operate at every stage of production. It makes sure that the product will do the job it is meant to do, that it is reliable and that the materials are up to the necessary standard. The cost of carrying this out has meant that many small firms have not even investigated quality control. But it is a cost that keeps down costs, saves production time and enables the same machine to produce more. It is an investment that in time is amply repaid.

Sharpening the Weapon

AFTER next Friday (September 29) it will be easier for the smaller firm in our industries to obtain advice and information on quality control. On that day the UK's new National Council for Quality and Reliability meets for the first time. The decision to establish this was agreed at a London conference of 22 organizations, representative of all sides of industry. At this conference Sir Charles Norris, director of the British Productivity Council, stated that the aims of the new body would include: acting as a central source of information; advising on quality control and reliability training courses; and organizing conferences. The chairman of the National Council, Frank Nixon, chief quality engineer of the Rolls-Royce aero engine division, has said: 'The problem is to convince many of the smaller firms — and more than 75% of Britain's manufacturing concerns employ fewer than 100 people — not only that they can afford to install modern quality control, but that they *cannot afford* not to'.

As we have said, much pioneer work on quality control was done in the UK. It is ironic that our industrial rivals overseas are making more use of it than we are. It could be a vital weapon in the battle to raise our exports from their present parlous state. Friday's meeting will sharpen it, but it will be no use unless a far wider section of industry is prepared to take it up.

On the Shelf

THE polymer industry is full of examples of chemicals that have been discovered, shelved as mere curiosities — and then suddenly taken down from the shelf and developed into materials of major industrial importance. When I.C.I. research workers discovered polythene as a white powder resulting from a study of the effect of high pressures on chemical reactions, its significance as a plastic was not recognized for some time. The story of Terylene is a comparative rarity, since it must be one of the few major polymers that has not only spent no period of its life on the shelf, but was the result of a calculated, deliberate programme of research.

The first meeting of the 1961-62 session of the heavy organic chemicals group of the Society of Chemical Industry, which will be held on October 6*, will deal with one of these materials which started out as a chemical curiosity, but which is now so important that it is impossible to conceive what the rubber and plastics industries would be like without it. Styrene was only of laboratory interest until the end of the 1930s when Dow and I. G. Farben started large-scale manufacture of styrene and polystyrene. War and the demand for rubber as a strategic material provided the stimulus. With the stoppage in supplies of natural, the US Government initiated its high-pressure programme for the production of SBR.

Demand for styrene continued to shoot up after the war, particularly in the fifties, leading to continuous improvements in the styrene manufacturing process. Although various alternative processes have been developed, the synthesis of ethylbenzene from ethylene and its subsequent catalytic dehydrogenation is still the most important method. Overall yields of over 90% from ethylene and benzene to finished styrene at 95% on-stream time are obtained. Outlets for styrene continue to grow — besides polystyrene and SBR it is finding increasing applications in the polyester resin and surface coating industries. When we look back on the history of styrene, we might well wonder for a moment what materials are stowed away on the shelves today that will be flowing in enormous quantities from our chemical plants of tomorrow.

* At 14 Belgrave Square, London, S.W.1. A paper on styrene monomer manufacture will be delivered by J. N. Hornibrook (Monsanto Chemicals Ltd.)

NEWS *Briefs*

FIRESTONE'S BETHUNE PLANT ON STREAM—BIG PROMOTION FOR HT VINYL—CHINA BUYS FROM INDONESIA — FDA APPROVES POLYACRYLAMIDE

●**India** — The Premier Tyre factory established in Kerala with the technical collaboration of the US Dayton Rubber Co., is expected to go into operation at the end of this year. The factory, being put up on a 40-acre plot off the national highway at Kalamassery — industrial suburb of Ernakulam — will have a capacity of 1,000 tyres and tubes a day. Chandrakant S. Desai, director of the company, says that 75% of the civil engineering work has been completed and 80% of the machinery imported from the USA, West Germany and the UK has arrived. Mr Desai adds that the company plans to double production capacity in due course.

●**France** — Firestone Tire and Rubber Co.'s Bethune plant was dedicated on Thursday (September 21). It is the company's sixth in Europe. Production of polybutadiene will begin later this year in the plant being built at Port Jerome. Much of this rubber will be used in tyres produced at Bethune.

●**United States** — A national marketing programme for rigid vinyl pipe that withstands both boiling water and hot corrosive chemicals is being carried out by B. F. Goodrich Industrial Products Co. High-Temp Koroseal pipe, manufactured from a BFG material that was only a laboratory curiosity just two years ago, is described by the company as 'the first significant breakthrough in the vinyl industry since development of the first rigid vinyl 13 years ago'. The piping withstands temperatures up to 200°F. — about 60° higher than conventional rigid vinyl.

●**Indonesia** — China wishes to buy from Indonesia 90,000 tons of rubber as well as other products, the Director of State Trading Companies has announced in Djakarta. The Director said that with high duties pricing Indonesia out of the European Common Market, an expansion of trade now with China would be advantageous. Indonesia, he said, was also making trade arrangements with other Eastern Bloc countries.

●**Japan** — In a move to curb imports, the Japanese Government has announced increases in the amounts importers will have to deposit with the Bank of Japan on import shipments. Until now, importers have been required to deposit bonds with the bank for up to 1% of the import value of the shipment. Effective now, the proportion to be deposited will range from 0.1 to 35%. The new rate for crude rubber has been fixed at 5%.

●**Italy** — A press conference in Venice previewed the Second World Congress of Man-made Fibres, to be held in London from May 1-4 1962. Three thousand delegates are expected to attend the Congress. Man-made fibres now account for 22% of all fibres produced in the world — double the percentage of just before the war.

●**South Africa** — Everite Ltd., Klip River, Transvaal, is now manufacturing Paxit polyester/glass sheeting, both flat and corrugated, in sizes up to 12ft. x 4ft. Successful use in outlets such as roof lighting is leading to increasing interest in reinforced plastics in South Africa.

●**West Germany** — The Shell/BASF owned Rheinische Oleginewerke GmbH of Wesseling, has increased its polythene capacity to 130,000 tons. Ethylene capacity has been lifted to 150,000 tons.

●**United States** — The Food and Drug Administration has given polyacrylamide a clean bill of health for use in the food packaging field. It states that it may be used within defined limits in conjunction with paper for food packaging under the provisions of the US food additives law. The polymer must, however, contain less than 0.1% of residual monomer.

●**Czechoslovakia** — Under a long-term trade agreement between Nigeria and Czechoslovakia signed in Prague on September 19, Czechoslovakia will receive Nigerian rubber, among other goods, in exchange for machines and equipment, including complete industrial plants, the Czechoslovak news agency Ceteka reported.

●**Australia** — Imperial Chemical Industries of Australia and New Zealand is to raise A£8.76m. in a one-for-four issue to ordinary shareholders at a premium of 30s. The issue, which is to be underwritten by I.C.I. in London, follows the three-for-seven scrip issue in June. The directors have given no indication why the additional funds are required.

'Ar! — Oi reckon we fooled 'em proper with that there new plasticizer mother! — 555

Plastics Research at Shawbury

FOUNDATION STONE OF £145,000 LABORATORY LAID

THE foundation stone of important new extensions to the research laboratories at the Rubber and Plastics Research Association of Great Britain was laid at Shawbury on Wednesday (September 20). The ceremony, symbolic of a coming together of interests in rubber and plastics research, was carried out by P. W. Howard, president of the Research Association.

The new laboratories, which will be mainly concerned with plastics research, will cost about £145,000.

Existing laboratories and buildings at Shawbury cover an area of more than 15,000 sq. ft. — the extensions will more than double the space devoted to the Research Association's activities.

The laying of the stone was an important stage in the implementation of the policy adopted by the RAPRA Council when the constitution was revised in 1960 (when RABRM became RAPRA).

THIS STONE WHICH COMMEMORATES THE MERGING
OF THE RUBBER AND PLASTICS INDUSTRIES OF GREAT
BRITAIN IN RESEARCH ENDEAVOUR WAS LAID BY
PERCY W. HOWARD ESQUIRE PRESIDENT
ON THE 20TH SEPTEMBER 1961

Impact on Industries

Speaking at the ceremony, P. W. Howard said that the results which would come from the new facilities would largely depend upon the director, Dr Watson, and the quality and ability of his team of scientists, technologists and other members of his staff. He thought it was encouraging, therefore, that the staff engaged at Shawbury in research, technology, and the important library and information services, were regarded by the director as unequalled in breadth of experience as well as in the impact of their work on the industries they served.

'The general pattern of work at Shawbury is, I think, by this time well known, as is the present Rubber Research Programme', said Mr Howard. 'In regard to the Plastics Research Programme, we are, of course, at present in the early stages of plastics research, but we now have the advantage of the experience of prominent members of the plastics industry on the Council of the Association, and the composition of a plastics programme is under careful consideration by the Plastics Research Committee, of which H. A. Collinson is the chairman. It is intended, however, that, at the outset, the programme will be designed to include work on standards and test methods, operational research, factory visits and research into the flow properties of plastics materials'.

After announcing that the Research Association was already negotiating a contract from the Ministry of Aviation to study some of the fundamental problems of glass fibre laminates, the president went on to hope that 'the time is not far distant when individual groups of manufacturers with special interests will support special projects at Shawbury. The plastics pipe manufacturers, for example, might well decide to institute research, evaluation and certification by an objective body with the reputation of the Research Association on a co-operative basis. This is the type of project Shawbury is well qualified and will be well equipped to handle and would welcome work of this kind'.

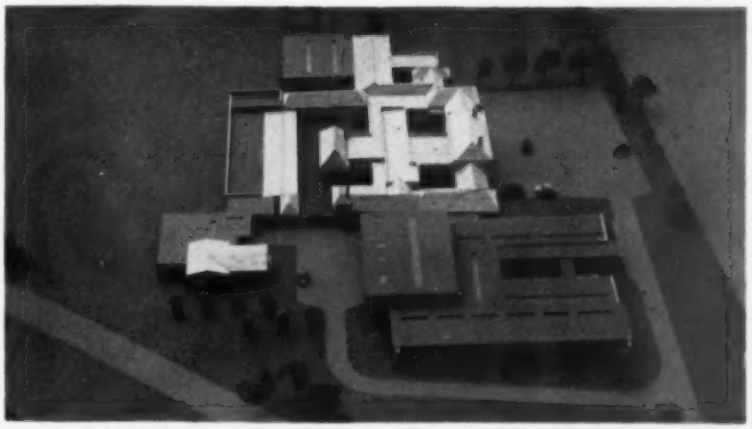
Mr Howard stressed that the nature and number of special projects which could be handled would naturally depend, not only on the continued, but on the increased support from the present and the potential members of the Research Association.

But, he added, there were still further important ways in which the Research Association could serve the rubber and plastics industries, not the least of which was in the field of exports.

Quoting Lord Baillieu, his predecessor in the presidency of RAPRA as saying: 'We face a stern battle for survival. In order to import raw materials required by British industry, we must export at prices the world will pay', Mr Howard pointed out that we were just in that position today, and there could, he thought, be no doubt about the significance of science and technology in promoting the industrial strength of the UK.

'The British rubber and plastics industries are virile industries', stated the president. 'They understand their export problems, but if we are to achieve and maintain competitive export prices, if we are to compete with thriving European countries and the increasing challenge of world competition, the work of this Association must be geared to those

Continued on page 481



Model of the RAPRA laboratories at Shawbury. Lighter areas are existing buildings, darker areas are the planned new extensions

Polypropylene Yarn Production

ULSTRON PILOT PLANT STARTS UP AT WILTON

IMPERIAL Chemical Industries Ltd. has started production of Ulstron — its new high-tenacity polypropylene filament yarn — on a pilot plant at the company's Wilton Works in North Yorkshire.

The first full-scale plant, with a capacity of 5m. lb. a year, will commence production at Wilton by the end of 1961, and extensions will be built as required at the company's new site at Kilroot, Northern Ireland.

Since August 1960, when it obtained from Montecatini the rights for the manufacture and sale in the UK of polypropylene fibres, I.C.I. has been carrying out development work on polypropylene filament yarns. The first commercial uses of Ulstron will be for fishnetting, twines and ropes.

The company states that 'the low price of Ulstron (7s. to 8s. a lb.), coupled with its low specific gravity, will result in considerable economies for marine uses over other synthetic fibres'.

Leading twine and net makers are now able to receive enquiries for the yarn, and it is expected that ropes made from the new yarn will be on the market early next year. The yarn is available in small quantities for market evaluation, and will eventually be used in similar outlets.

Polypropylene is said to be the only man-made fibre available to the fishing industry which combines to such a high degree the important properties of great strength, extreme lightness and negligible water absorption. And, by special production techniques, I.C.I. claims to have succeeded in making Ulstron stronger than any other polypropylene yarns currently being produced elsewhere in the world.

I.C.I. anticipates that Ulstron will become one of the major industrial yarns in this country.

Small Pinholding

H. K. Furniture Ltd. will shortly launch a new design of luxury-type armchairs with backs cushioned with 2in. thick Blockfoam, the Hairlok Co.'s patented latex foam.

For the backs of their settees H. K. Furniture is already using Blockfoam, recently introduced to the trade as a latex foam which lends itself to making angled cuts — for chair cushions, back rests, arms — without facing. The characteristic of 'exceptionally small diameter pinholing' is said to give more foam and less cavitation, and therefore more even support.

Hairlok rubberized hair, in thicknesses from 1–3in. is used in nearly the entire HK range of settees, arm and occasional chairs. It is supplied from Hairlok's factory in Bedford as fabricated units to the furniture firm's specification.

Top Deck PVC

A special quality pvc-coated fabric to resist weathering, manufactured by Bernard Wardle (Everflex) Ltd., is being used by the Devon General Omnibus and Touring Co. Ltd., for upper deck seating. The buses were used as 'open-tops' this summer.

Exhibition After-effect

Orders and inquiries worth more than £600,000 have been received by Burtonwood Engineering for plastics machinery as a result of their participation in the British Trade Fair in Moscow and Interplas 1961, it has now been announced.

At Moscow all machinery exhibited, to a total value of £12,500, was purchased and tenders requested for a further £259,000 worth of plastics machinery. At Interplas, orders totalling £104,000 were received, as well as inquiries worth £250,000.

Plastics machinery manufactured by Burtonwood Engineering includes Burtonwood-Cumberland size reduction machines such as granulators, dicers and pelletizers, and Burtonwood-Andouart thermoplastic extruders capable of high-speed, high-quality output.

Bayer Chairman Dies

ULRICH Haberland, chairman of the German chemical giant Farbenfabriken Bayer of Leverkusen, died suddenly last week at his home at Antweiler. He was 61.

Since the dissolution of IG Farbenindustrie AG, which he joined in 1928, and the re-establishment of Bayer in 1951, Professor Haberland has guided the concern through a difficult period of reconstruction to its present world status. Bayer now employs 60,000 people; 13,000 products valued at practically £265m. go to all parts of the world.

Professor Haberland was very active in the social sphere at Bayer. He arranged for more than 17,000 homes to be built for the personnel, many of which are today privately owned. It was his idea to offer every year at preferential rates shares of the company to personnel. More and more people have taken advantage of this so that now more than 20,000 people hold shares.

The University of Bonn honoured him with a Professorship and appointed him to their Senate. The Universities of Cologne and Bonn and the School of Technology in Aachen invested him with honorary doctorates. He was a member of the committee of the Max Planck Society and a member of the board of Founder Association for German Science.

British Moulded Hose

British Moulded Hose Co. Ltd., a subsidiary of BTR Industries Ltd., announces that it is in full production of long-length moulded and braided hose at its Watford factory after the fire on June 21.

The company states that 'the resumption of production at an even higher level of activity and much earlier than anticipated has been achieved through the combined efforts of all personnel'.

Commercial Manufacture of EP Rubber

THE first commercial manufacture in the USA of ethylene propylene synthetic rubber has been announced by Dr J. E. Wood, president of Enjay Chemical Co., a division of Humble Oil and Refining Co.

The rubber — designated Enjay EPR/Ethylene-propylene rubber — is now being sold in tonnage quantities from commercial facilities at Baton Rouge, Louisiana. It is being offered at an introductory price of 26 cents per lb., fob plant in carload lots, for market development and commercial use.

According to Dr Wood, 'this new synthetic possesses outstanding resistance to ozone, weathering and chemicals and is expected to attract strong interest in the electrical and other industries'.

Enjay Chemical Co. supplies butyl rubber for tyres and tubes, wire and cable insulation and many widely-used mechanical parts.

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A production line of Francis Shaw 3-inch rubber extruders with centralised control. All Francis Shaw extrusion machines are designed for flexibility of application and consistency of product.

* Francis Shaw Extruders serve every branch of the Rubber Industry
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Constant research and development, close co-operation with users, advanced design, selected high quality materials...
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OVERSEAS AGENTS THROUGHOUT THE WORLD

P4395

Little Lever Grows Bigger

£500,000 BATTERY CONTAINER MOULDING PLANT OPENED

A NEW £500,000 battery container moulding plant was opened at the Little Lever factory of United Ebonite and Lorival Ltd. on Tuesday (September 19). The new plant, which is believed to be the most modern in the world, occupies a self-contained building of 40,000 sq. ft.

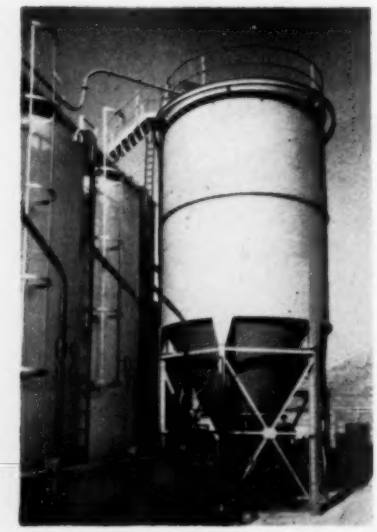
It is equipped with the latest automatic devices for measuring and mixing the raw materials, and robot trucks to carry the processed material to the moulding presses. Underground ducts supply all services — steam, cooling water, compressed air and hydraulic operating pressure — to the presses, and the steam pressures used enable faster operating cycles to be maintained.

The automatic plant will substantially increase productivity in the mixing bay. The new plant has its own electricity sub-station and maintenance staff for servicing the moulding tools and presses.

Production Flow

At one end of the building is a three-storey section housing raw materials on the top floor, to which they are delivered on pallets by a goods lift. Production flows from the top floor to heavy mixing plant on the two floors below, through the single storey press shop to the warehousing bay, where finished containers are stored on pallets ready for despatch.

The raw rubber and other ingredients are fed into the process in measured quantities by an automatic proportioning unit. This equipment is controlled by punched cards and is such that if one ingredient is incorrectly weighed the batch cannot be fed to the mixing plant.



Storage hoppers for raw materials at the new Lorival plant

The mixing plant consists of two No. 9 Bridge Banbury mixers, interlocked with the automatic weighing equipment, which also controls the time the material is in the mixer.

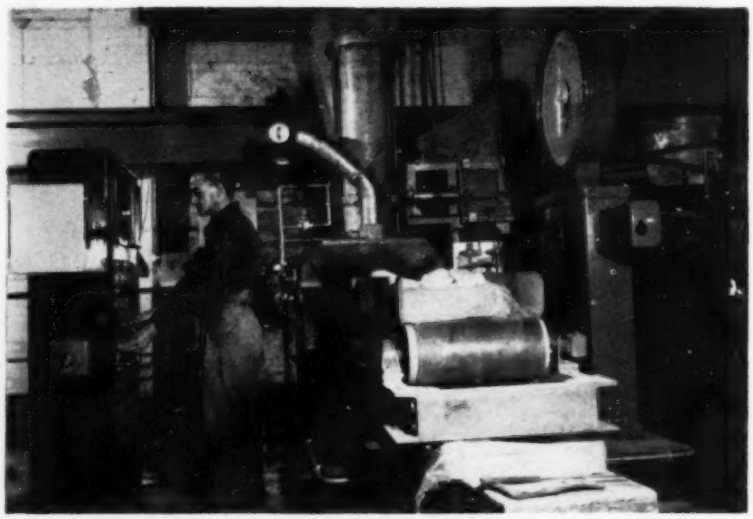
Discharge to Mills

The Banbury mixers discharge to Bridge 84in. rubber mills, which are fitted with a number of devices to assist in the blending of the rubber. When the blending cycle is completed the material is taken from the mill in a continuous sheet, fed through a cooling bath and cropped into sheets. These pass to a vertical cooling elevator, in which they rise to the top floor and down again to the middle floor where they are automatically discharged on to stillages. Here the material undergoes a further mixing process through a smaller Banbury to prepare it for the moulding stage.

Driverless Truck

From this mixer the material is transported to the presses by a driverless electric truck, the steering being controlled by means of an electric cable buried in the ground. The truck follows the cable and stops at predetermined points for moulders to collect batches of material, after which it returns automatically to the mixer for re-loading.

The Press Shop contains four rows of presses for the moulding of car battery and traction cell containers. At hourly intervals each moulder moves the containers he has made on a special trolley to a reception area where they are examined, electrically tested and packed in types on pallets.



Automatic weighing of raw materials for the rubber moulding mix

These are moved by fork lift trucks to the warehousing bay for ultimate despatch. Finally, low-loader trailers are used for delivery to customers and, while the towing portion is away, small fork trucks load the trailers two pallets high with containers.

Natta to be Honoured in London

The First International Synthetic Rubber Gold Medal, presented by *Rubber and Plastics Age*, has been awarded to Professor Giulio Natta of Milan, for his work on the structure and properties of synthetic polymers.

Rubber Dinner

The medal will be awarded at a rubber industry dinner in London on October 3 by Sir Edward Beharrell, chairman of Dunlop Rubber Co., and of the International Synthetic Rubber Consortium.

The award was made by an international selection panel representing the rubber industries of the UK, USA, France, Germany and Holland. Tickets for the dinner can be obtained from Rubber and Technical Press Ltd., Gaywood House, Great Peter Street, London, S.W.1.

See Men and Matters page 478.

Down Comes Chlorobutyl...

You can now get a lot more Chlorobutyl for your money. In full commercial production, it costs only 2/6 a lb ex store, duty paid. Chlorobutyl—now known as Chlorobutyl HT10-66—offers several advantages: compatability with other elastomers; increased cure rate; and wider choice of cure systems. Chlorobutyl HT10-66 has already been used with considerable success in America for tubeless tyre inner liners and non-toxic compounds for food containers, high-temperature steam hose, conveyor belting, and various moulded and extruded items. Samples and details of compounding and applications are available from:

Chemicals Division, Esso Petroleum Company, Ltd, 50 Stratton St, London W1. Phone: HYDE Park 7030.

Esso CHEMICALS

ESSO MEANS BUSINESS IN CHEMICALS

Fire Extinguishing Polymer

APPLICATIONS IN PROTECTIVE CLOTHING FIELD

A NEW kind of nitroso rubber has recently been developed by Dr Juan C. Montermoso, Elastomer Branch, Chemicals and Plastics Division, US Quartermaster Research and Engineering Command, that is not only flameproof but puts out the fire itself. If in contact with a flame the rubber will not only refuse to burn, but will give off a gas that tends to extinguish the fire. The new material can also take cold as well as heat and remains flexible at −40°C. It is also resistant to solvents and other chemicals and will not deteriorate in sunlight.

Gases evolved in the decomposition of this trifluoronitrosomethane tetrafluoroethylene copolymer tend to extinguish the flame

The new material is a copolymer of trifluoronitrosomethane and tetrafluoroethylene and a vulcanization system, using a combination of amines and carbamates, has been developed. Investigation of various reinforcing fillers indicates that a fine particle silica gives the best result for the purpose.

Many applications are foreseen for the material. One important possibility would be as safety fabric coating for army uniforms. Against nuclear blasts with short impulse high-intensity heat, materials currently available burst into flames. Uniforms made from nitroso rubber will not flame, though they may decompose, thus preventing the possibility of making human torches out of soldiers.

Fire Convention

Products from the Dunlop Rubber Co. Ltd., Coventry, on view at the Chief Fire Officers' Convention in Edinburgh from September 25 to 28, include transportable, self-contained pneumatic charging sets, underwater swimsuits, powered inflatable marine craft, pressure switches, and underwater breathing apparatus.

The Dunlop damage control breathing apparatus to be shown is specially designed for fire-fighting and salvage work.

Move for Jennings

Jennings Engineering (GB) Ltd., and its two associate companies, Chemitrade Ltd. and Stratton Chemicals Ltd., formerly of 17 Stratton Street, W.1, have moved to new offices at Berkeley Square House, Berkeley Square, W.1. Telephone GROsvenor 3422.

New Polyester Resins and Prices

IMPROVEMENTS in basic raw materials manufacture have enabled British Resin Products Ltd. to make additions to its range of Cellobond polyester resins and a general reduction in polyester resin prices, the company stated on Monday (September 18).

Eight new isophthalic based polyester resins, a new general purpose resin (A 2624) selling at below 2s. per lb. for over 2,000lb. lots and T1442, a new promoter, are now available in addition to the established grades.

Isophthalic based polyester resins have improved chemical resistance and adhesion and are rapidly superseding orthophthalic resins for applications where these qualities are necessary. The new promoter is said to increase the rate of resin cure without disturbing the gel time and thus allows faster mould turn-round.

The new grades of resin are:

A 2624 — a general purpose resin.
A 2657 — a low viscosity thixotropic version of A 2624.
A 2781 — isophthalic based, non thixotropic general purpose resin.
A 2782 — isophthalic based, thixotropic general purpose resin for wet lay-up.
A 2783 — isophthalic based, wax containing version of A 2782 for tank lining.
A 2784 — isophthalic based, chemical resistant grade.
A 2785 — isophthalic based, thixotropic version of A 2784.
A 2786 — isophthalic based, matched metal moulding resin.
A 2787 — isophthalic based, flexible thixotropic gel coat resin.
A 2788 — isophthalic based, non thixotropic version of A 2787 for blending.

The Commonwealth Visits Bakelite

TWELVE of the delegates who are attending the Seventh Commonwealth Parliamentary Conference have taken the opportunity of seeing something of the manufacture of plastics in the UK.

On Wednesday (September 20), the delegates visited the Birmingham factory of Bakelite Ltd. Accompanying them were representatives of Birmingham City Council.

The tour had been arranged so that the visitors could see as much as possible of the wide range of plastics raw materials produced. They include phenolic, polyester and epoxide resins, moulding materials and laminated plastics of the industrial and decorative types; copper clad which is widely used by the radio and electronics industry for printed circuits, and Warerite surfacing material.

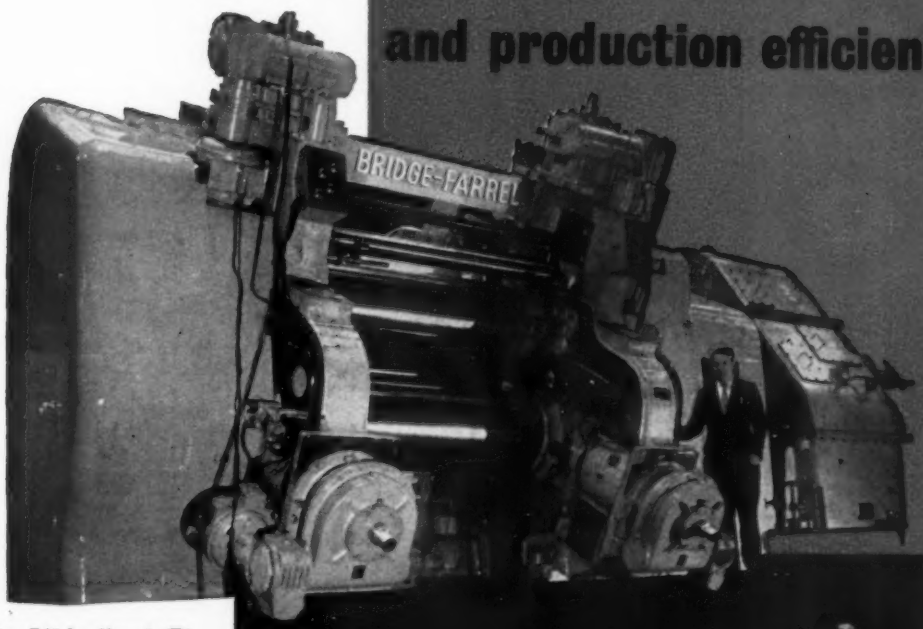
The delegates included Sardar Hukam Singh, MP, deputy speaker of Lok Sabha, India, Thomas Lyons, MP, deputy speaker, House of Commons, Northern Ireland, and Paramount Chief the Hon. Raymond B. S. Koker, Minister without Portfolio, Sierra Leone.

Dixon's Blazes

The Avon India Rubber Co. Ltd. is negotiating for a site in the 'Dixon's Blazes' industrial development in Glasgow. The area is being developed by Taylor Woodrow.

BRIDGE FARREL equipment

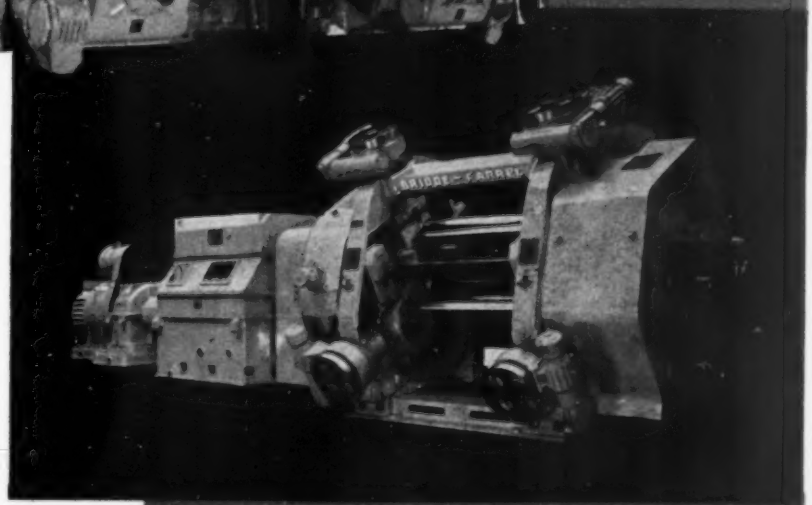
. . . acclaimed as the ultimate in design and production efficiency



28" x 74" Inclined 'Z' Plastics Calender.

Advanced engineering features include patent hydraulic loading on the final nip and all the finest features of Plastic Calender Design.

BRIDGE-FARREL calenders give tolerances of ±.0001" on thin calendered plastic film at speeds up to 320ft. per minute.



Bridge-Farrel 24" x 66" 3-Roll Triang[illegible]r Calender. The illustration shows one of several recently built and in operation, and considered to be the fastest precision Rubber Calenders in the world.

BRIDGE FARREL equipment for the Plastics Industry

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PLASTICIZERS FOR PVC — PART 3

Common Monomeric Plasticizers

ADVANTAGES AND LIMITATIONS OF INDIVIDUAL MATERIALS

By W. S. PENN, BSc

This is the third in a series of articles on plasticizers for pvc by W. S. Penn, whose recent series on stabilizers in *RPW* aroused wide interest. Properties of individual plasticizers are considered — the group classification referred to was explained in *RPW* September 16, 430

THERE is a large number of plasticizers from which the technologist has to make a choice. He is guided by the division of plasticizers into groups but this technique can only give limited information. At some stage a detailed study of individual plasticizers must be made.

Fortunately, some plasticizers are commonly in use which limits the range which needs to be considered. Much is known about many of these plasticizers in general terms so that a brief description of each would indicate the possibilities and assist in a choice. It is therefore proposed to consider the properties of individual plasticizers in the present article and details of the common types described are given in Table 1.

TABLE 1
LIST OF COMMON PLASTICIZERS

Name	*Abbreviation*	*Group*
Di-octyl phthalate ..	DOP	1
Di-iso-octyl phthalate ..	DIOP	1
Phthalate 79	DAP	1
Di-butyl phthalate ..	DBP	1
Di-capryl phthalate ..	DCP	1
Di-2-butoxy ethyl phthalate	—	1
Di-nonyl phthalate ..	DNP	1
Di-isodecyl phthalate ..	—	1
Tri-tolyl phosphate ..	TTP	2
Tri-xylyl phosphate ..	TXP	2
Tri-octyl phosphate ..	TOP	2
Di-butyl sebacate ..	DBS	3
Di-octyl sebacate ..	DOS	3
Di-octyl adipate ..	DOA	3
Di-iso octyl adipate ..	DIOA	3

The list of plasticizers given in Table 1 does not include Groups 4 and 5. This is because the majority of the plasticizers in these groups are commercial products sold under trade names. They are therefore considered in a later article.

The 79 Plasticizers

Many references will be found in the plasticizer literature to products with the number 79 in the name. Such materials are usually employed for replacing octyl esters and in view of their growing importance some explanation of their nature is necessary.

DOP is an ester of octyl alcohol and phthalic anhydride and is relatively expensive. Some time ago, the idea was conceived of not making alcohols from pure C_7, C_8 or C_9 alcohols, but from their mixtures. In other words, in cracking waxes into olefines, the C_7 — C_9 fraction is not separated into individual alcohols and thus plasticizers are made from the mixtures. It will readily be appreciated that the mixtures are considerably cheaper than the pure products. The mixture of alcohols is sold under a Shell Chemicals and I.C.I. trade name — Amphanol 79.

Thus various companies sell a series of plasticizers based on Amphanol 79 usually incorporating part of this name in the product. Examples include Phthalate 79, which is a fairly straight replacement for DOP yet much cheaper; DA79P, Phthalate of Alphanol 79; Phthalate 979/ME and so on.

Group 1 Plasticizers

Some detailed descriptions are given below of the Group 1, phthalate plasticizers. A method of choosing between them and the plasticizers of other groups is given in a later article.

Dioctyl Phthalate

This is the most common plasticizer. It is completely miscible with pvc into which it mixes readily. For many applications it is perfectly satisfactory to use on its own since it has good electrical properties, fair low temperature properties, moderate volatility and reasonably low extraction and toxicity properties.

Other advantageous properties of DOP will become apparent when it is compared with its substituents, details of which are given below.

Di-iso-Octyl Phthalate

This plasticizer (and Phthalate 79) is an effective and cheap replacement for DOP.

DIOP is a good primary plasticizer very similar to Phthalate 79 but is superior in that compounds containing it have less odour than those with Phthalate 79. It has good electrical properties, only marginally inferior to DOP, and consequently is widely used in the cable industry, often as a complete replacement for DOP.

DIOP has good stability to heat and light in average compounds. However, where resistance to heat over long periods is concerned, it is slightly inferior to DOP and Phthalate 79, but except for the most stringent requirements, where polymeric plasticizers would be used anyway, this need not be taken into account.

The toxicity of DIOP is very low and it can therefore be used in food packaging compounds. It is satisfactory for foods having a high water content such as fresh fruit and vegetables, for various drinks including milk, but, because it is extracted significantly by oils and fats, it is not suitable for lard, butter, margarine, bacon and similar products.

Its plasticizing efficiency is almost as good as DOP, the same applying to its cold flex properties and volatility. In all cases it is only marginally inferior.

As far as extraction by solvents is concerned, this property varies according to the solvent and a detailed comparison, also with Phthalate 79, is given in Table 2.

DIOP is a useful plasticizer in plastisols. Since its solvating power for pvc at room temperature is inferior to DOP it gives plastisols with very good shelf life. The initial viscosity of such products is also reasonably low. The effect is illustrated in Table 3.

Phthalate 79

This plasticizer is very similar to DOP but is cheaper. It gives almost exactly the same results from the

TABLE 2
EXTRACTION OF DIOP BY SOLVENTS
PER CENT BY WEIGHT LOSS

Solvents (at 20° C.)	*DIOP*	*DOP*	*Phthalate 79*
Distilled water (in for 10 days)	0.045	0.090	0.091
1% Soap solution (10 days)	0.358	0.255	0.362
1% Detergent solution (10 days)	0.510	0.581	0.580
Mineral oil (10 days)	1.530	1.820	2.100
Iso-octane (1 day)	22.842	23.200	22.960
Di-iso-butylene (1 day)	25.060	25.100	23.020
70 : 30 Iso-octane and toluene (1 day)	15.820	15.700	16.540

point of view of volatility, physical properties, resistance to extraction by solvents and cold temperature properties. It is just marginally inferior on electrical properties.

DAP is highly compatible with pvc and polyvinylidene chloride. It has better plasticizing properties than DOP itself.

DAP, like DIOP, is extremely useful in pvc pastes for the production of plastigels, etc.

TABLE 3
PLASTISOL VISCOSITY CHANGES
POISES AT 23 C.

Time lapse	*Phthalate*			
(days)	*DIOP*	*DOP*	79	*DCP*
2	29.5	36.1	31.8	27.0
15	38.2	50.4	42.3	37.2
30	42.0	55.8	51.4	41.5

Di-Butyl Phthalate

This is one of the most effective plasticizers and one of the best from the compatibility point of view. Unfortunately it has very high volatility which seriously impairs its widespread use. It also has high solubility in water, another limiting factor.

BDP does give compounds of high flexibility and perhaps this is its safest use bearing in mind the limitations outlined above.

Di-Capryl Phthalate

DCP is an isomer of DOP and has many similarities. Its effectivity is almost exactly the same as DOP, being only marginally inferior. The same may be said of its low temperature properties, heat and light stability. Its toxicity is low. It can be used for most purposes in place of DOP but it does give marginally stiffer and harder compounds.

DCP confers good electrical properties and is capable of giving compounds with volume resistivities of 1.0–5.0 x 10^{13} ohm.cm. or more, which is as good as DOP.

DCP is even better than DIOP in plastisol formulations. The initial viscosity is less and it increases less on ageing, illustrated in Table 3.

Di-2-Butoxyethyl Phthalate

This material is too expensive for general purpose use. However, it is invaluable as a process aid since it promotes rapid fluxing and improves flow characteristics.

The plasticizer is perhaps most valuable in calendered products where 10% to 20% of the usual plasticizer may be replaced. It tends to disperse air in rolling banks and thus helps produce more perfect calendered unsupported sheets (or coated fabrics) particularly with respect to freedom from blisters. The rate of production may also be increased.

Di-2-butoxyethyl phthalate is also used in organosols and plastisols where it confers low initial viscosity, good ageing properties and rapid cures at curing temperatures.

Di-Nonyl Phthalate

This plasticizer gives rather similar physical properties to TTP including the same BS softness for a given loading. However, it has a flex point about 10°C. below TTP and is often used as a partial replacement for it for this reason.

DNP, like TTP, has low volatility and therefore good ageing properties at high temperatures. Unlike TTP, however, it does not tend to discolour on exposure to light.

Di-isodecyl Phthalate

As a higher phthalate, this plasticizer has much lower volatility than the lower members of the series. It is thus used for high temperature applications combined with reasonable low temperature properties, certainly better than TTP and DOP.

For the same quantity of plasticizer the compounds are fairly hard, but flexibility does not vary excessively with temperature.

Group 2 Plasticizers

By far the most important of these is TTP, but some replacement types to give cheaper products and/or better low temperature properties are being used on an increasing scale. Descriptions of the more common types are given below.

Tri-Tolyl Phosphate

There is probably more known and recorded about TTP than any other plasticizer. But for its poor low temperature and toxic characteristics it would probably be the most widely used of all plasticizers.

TTP is not quite as effective a plasticizer as DOP. It has very good compatibility itself and, perhaps just as important, it assists the compatibility of materials otherwise not particularly compatible. Such materials include secondary plasticizers and extenders as well as such additives as antistatic agents which, without the presence of TTP, might well exude to the surface. This property of low exudation also probably accounts for the low tendency of pvc films incorporating TTP to separate from bonding primers.

TTP can be used in pvc compounds processed by nearly all methods. It has all the virtues of DOP except for those mentioned above, but it has additional properties to offset these defects. The most important is its fire resistance. One of the biggest applications where the fire-resistance has been of importance is in conveyor belts for coal mines. It is fortunate that such compounds also have good abrasion resistance.

TTP also confers good weathering resistance for outdoor service and more resistance than other plasticizers to fungus and bacterial attack, although nothing appears to impart complete immunity to these agents. Compounds plasticized with TTP also have the greatest resistance to high levels of radiation.

The poor low temperature properties of TTP do not form an insurmountable barrier. The cold flex point can be depressed considerably by using proportions of an adipate or sebacate not greater than about 25% to 30%.

The usual properties of TTP are very good. It has low volatility, good electrical properties and good resistance to extraction by aliphatic hydrocarbon oils and solvents and water. It has consequently been used in the formulation of printers' rollers. TTP cannot be taken internally or used in compounds for food packaging. However, if handled with normal precautions it is quite safe in the factory and large quantities are used each year.

TTP is used extensively in paste forming resins. Generally, the plasticizer gives low viscosity plastisols with good shelf ageing and rapid gelation at curing temperatures.

Tri-Xylyl Phosphate

Almost everything which has been said about TTP also applies to TXP. It is difficult to find any real differences between the two but compounds containing the same amount of plasticizer are harder and stiffer. Consequently, a greater percentage of TXP is required to give the same flexibility.

Since TXP is so much cheaper than TTP, it is growing in use as a replacement. Since the specific gravity is also lower, this accentuates the difference in cost and offsets the greater proportion which needs to be used to maintain the same flexibility.

In any experiment where it is proposed to use TTP, it is worth trying the equivalent proportion of TXP. Where blends of these phosphates with other plasticizers are used, then in many cases it will often be permissible to make a straight change.

Tri-Octyl Phosphate

This plasticizer has many properties which are equivalent to TTP. However, it has rather better low temperature properties and may be used to replace partially TTP to im-

prove this property whilst retaining the flame resistant characteristics.

TOP is not such a good processing plasticizer as TTP but if used as a partial replacement, no difficulty will be experienced. TIOP is very similar to TOP.

Group 3 Plasticizers

These are the low temperature plasticizers which normally include sebacates, adipates and azelates. However, the sebacates and adipates are by far the most common and some details are given below.

Di-butyl Sebacate

The effectivity of DBS is very high, which is fortunate in view of its high cost. This means that blended with phosphates or phthalates in quite low proportions, it can still impart good low temperature characteristics which is its main function. However, it also has good ageing properties and is non-toxic.

Its compatibility is good, but not very good, but it is rarely, if ever, required to be used above its safe compatibility limit. Its viscosity is low and its volatility fair but it has good resistance to extraction by water, soaps and detergents.

It can be used to give good drape and feel characteristics to sheets used in the manufacture of clothing and upholstery.

Di-Octyl Sebacate

DOS is similar to DBS in most of its properties although its volatility is considerably lower. This means that coupled with its excellent low temperature characteristics, it can also be used safely at elevated temperatures.

The material has good electrical properties and is the best plasticizer for cables used at low temperatures. Like most low temperature plasticizers, it is liable to extraction by hydrocarbons and is liable to migrate. The use of this type of plasticizer is therefore limited in this respect.

Di-Octyl Adipate and Di-Iso-Octyl Adipate

These are two excellent low temperature plasticizers, similar in most characteristics. The DIOA is rather cheaper than DOA, hence the general reason for its use. Neither of the two is quite as effective as DOP (the DIOA being the worst in this respect) and both have a little inferior volatility to DOP.

Since the DIOA is not as effective as DOA, more of it is needed to give the same flexibility, but since its sg is lower, the saving in cost is still worthwhile.

Both plasticizers are 'good' in the sense that they plasticize well. Both give good hand and drape and are effective process aids for calendering in particular. Resistance to heat, light and extraction by water is also quite good.

Interesting properties of DIOA are its electrical characteristics. It gives compounds with low volume resistivity, which means, of course, that they are poor insulators. Such compounds may be employed where static is a problem and are effective adjuncts to anti-static agents.

Conclusions

The above list of plasticizers includes most of the common types used in the UK with the exception of those sold under proprietary names. Many of the latter are carefully prepared blends of esters designed to combine the best properties of two or three types. They will be considered in a future article but it will be realized from the plasticizer descriptions given that a wide range of properties is open to technologists.

The descriptions of plasticizers given should only be used as a general guide. The usual experiments must be carried out to find which types are most suited for the particular application. It will be normal to start off with a well-known plasticizer, such as DOP, then replacements of this with plasticizers very near to it, such as DIOP, and this is usually followed by an examination of the cheaper 79 types. All of this work must be carried out in detail in the laboratory which should eventually be backed up with factory trials.

Special attention should be paid to the use of these plasticizers in plastisols. Although the finished properties of articles made from plastisols will depend on the type of plasticizer used in much the same way as solid products, the processing properties may be very different. In other words, the viscosity ageing characteristics of plastisols may be considerably modified by the type of plasticizer used so that this aspect must be fully considered when making a choice for work with pastes.

The next article in this series, which will be published in two parts in the September 30 and October 7 issues of *RPW*, is devoted to commercial plasticizers. Many of these are sold under proprietary names and are frequently mixtures, or materials of indefinite chemical composition such as polymerics or petroleum residues. These are discussed individually and where possible an indication of their chemical nature is given.

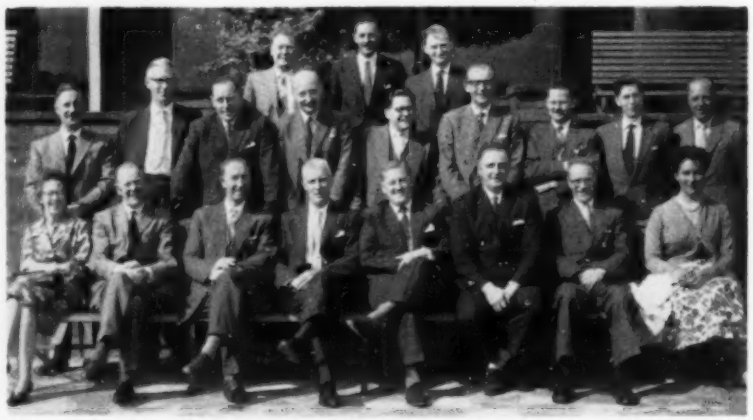
FBRAM Transport Committee

THE Transport Committee of the Federation of British Rubber and Allied Manufacturers makes a practice of holding two of its six meetings a year outside London. On September 14 it met in Birmingham. Those companies within reasonable distance of Birmingham were invited to send representatives to the meeting, and a number of ordinary and associate members chose to do so.

Under its chairman, J. Hattrell, of BTR Industries Ltd., the committee examined such matters as road and rail rates, transit times, conditions of carriage and special services. It further discussed dock delays, and the favourable commodity rates available for rubber products on internal UK air services.

The meeting was held at Fort Dunlop, and the committee and its guests were afterwards entertained to a luncheon by the Dunlop Rubber Company.

Pictured below: FBRAM Transport Committee and guests at Fort Dunlop.



BEHIND THE DUNLOP SYMBOL

When he experimented with the materials he had bought at a local chemist's shop, John Boyd Dunlop worked with a purpose . . . to make a practical pneumatic tyre for his son Johnny.
Purpose is still evident in the activities of Dunlop's 20 major laboratories in five continents . . . and still as practical. This year the Company's main Research Centre at Fort Dunlop has produced a new rubber, and built it into a new tyre with remarkable properties of safety, comfort, and silence. Just one example of the forward thinking expressed in the new symbol, designed to identify Dunlop activities, products and services the world over.

DUNLOP SYMBOL OF PROGRESS

CTH/PRS/23

VIEWS and REVIEWS

Microencapsulation

P. W. SHERWOOD writes in *Adhesives Age* for August 1961, Vol. 4, No. 8, pp. 23-5, on a new technique which has obvious applications far beyond the adhesives field. The idea is to enclose each particle of one of the reacting materials of a mixture in a thin covering which can subsequently be ruptured at will to disgorge its contents and so enable the reaction to take place.

This technique has been pioneered by the National Cash Register Co. and its biggest commercial use at present is in the making of 'carbonless carbon paper'. A colourless reagent, 'crystal violet lactone', turns intensely blue when reacted with 'attapulgite'.

'A 3% solution of crystal violet lactone in trichlorodiphenyl is encapsulated in gelatin to form microcapsules of three to five micron diameter. Fluid-dispersed capsular material containing this oil is applied to a sheet and dried to form a transfer film. The capsules may then be ruptured locally at points of writing or typing pressure to release the oil which will thereupon come in contact with the sensitized undersheet'.

Obviously, the principle is widely applicable. For instance, in resin-catalyst adhesives, the catalyst can be encapsuled and then mixed into the prepolymer. Such a mixture can be stored indefinitely and used as a dry powder or a liquid dispersion. Pressure will break the walls of the microcapsules, release the catalyst, and so reaction — and, therefore, adhesion — will occur at the point or area of pressure.

Another example from the adhesives field overcomes the tackiness of concentrated solutions of neoprene in aromatic solvents. The solvent may be microencapsulated and then coated or surrounded by the neoprene mix. Pressure, breaking the capsules, will form a solvent adhesive *in situ*.

Method of Encapsulating

The so-far most-highly-developed type of microcapsule has a wall material of a hydrophylic colloid, a gelatin-gum arabic being especially favoured. Under active development are encapsulating materials of synthetic polymers for containing aqueous solutions.

'The key to the microencapsulation process is the discovery that certain gellable colloids contained in an aqueous sol will deposit around dispersed individual oil droplets if mixed with an oppositely charged colloid and diluted with water to form a definite ratio of these three components. The effect of this deposition around individual oil drops is an encapsulation by the liquid sol which, upon cooling, is gelled to form the solid retaining walls of the droplets'.

This basic process is capable of many useful modifications. For instance, the capsule wall can be hardened after deposition, or blowing agents can be incorporated in it or in the contained liquid, so that they will break or burst on heating. Destruction or rupture by chemical or electrical means are also possible.

Viscous Variety

There is a laudable trend in rubber terminology to allow the term 'plasticity' to fall into disuse and to be replaced by 'viscosity'. Generally, as a guardian (self-appointed and therefore very earnest) of the language, I usually support all special words because they give greater precision and I oppose 'blanket' terms because they tend to create confusion. But, with 'plasticity', there is a greater difficulty.

It purports to make a distinction which is insupportable. It seeks to give a special name to the viscosity of solids, when the 'solids' concerned are really very viscous liquids.

In our industry, however, we are also often concerned with the viscosity of substances which are undeniably and obviously liquids, being clearly pourable or flowing at ordinary temperatures. It is with the object of helping with some of the technical and production problems involving viscosity measurements that I draw attention to an excellent paper by Stirling and Ho, called 'Viscous Variety', on pp. 56A-59A of *I/EC*, Vol. 53, No. 4. Anyone having a problem in viscosity measurement, especially a process control problem involving continuous, operational measuring, should consult this survey.

Sometimes, the liquid concerned behaves substantially in the ideal way, the Newtonian way, in which flow is directly proportional to the work applied, but generally the liquids we have to deal with are not ideal. They are sometimes thixotropic, *i.e.* shearing them decreases their viscosity; they may be dilatant, *i.e.* the viscosity increases on shearing; they may even be rheopectic, *i.e.* not only showing an increase in viscosity on shearing but retaining this increase for a time.

For these reasons, flow curves rather than single numbers, are often preferable for understanding or characterizing a process or product.

Laboratory Apparatus

The simplest, capillary-flow viscometers, such as the Ostwald, Saybolt, and Redwood, may be good enough, because they are applicable to a very wide range of viscosity and to both Newtonian and non-Newtonian liquids. There are also special capillary viscometers working at high rates of shear.

The falling-ball or falling-plunger is another simple method. More elaborate are the rotating-surface viscometers like the Brookfield, Ferranti, and MacMichael types.

All these may be regarded as instruments for the laboratory, a field which has been well explored and, in their class, highly developed. What is chiefly wanted now is more development of process viscometers, for measuring continuously in the production stream. Some such are available — and are described in this article.

Processing Viscometers

They include the Hallikeinan-Shell viscometer in which a sample is forced through a capillary at a constant rate of flow and the pressure developed is measured. This,

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

and a somewhat similar device by J. O. C. Vick for use in resin manufacture, demands regular flushing out. The Norcross viscometer meets this difficulty automatically, for it is a falling-plunger apparatus in which the plunger is automatically reset at the end of its fall and so cleans the important parts. A viscosity index is given by the number of cycles of fall-and-reset in a given period of time.

There are rotational viscometers, one of which can be used under pressure, and the viscosity is measured from the capacitance output or the motor current.

An interesting method is that of the vibrating probe, operated by a short, high-frequency pulse. The fluid damps the amplitude of vibration and, when this has fallen to a set level, the element is automatically pulsed again. The rate of pulsation is a measure of viscosity. This instrument has an extremely wide range.

Ultrasonic viscosity measurement is possible but is not very accurate.

More development is needed, and is certain to come, in this field of process control instruments which are not as accurate as laboratory instruments.

Evaporation

On page 41A of *I/EC* for August 1961, Vol. 53, No. 8, Pfaudler Permutit Inc. have an advertisement which depicts a wiper of which four are used in the Pfaudler Wiper Film Evaporator, for wetting the evaporator wall and so continuously exposing a uniform, thin film, thus greatly improving the thermal efficiency.

The idea is also discussed in the excellent review article 'Evaporation' by W. G. Dedert on pp. 669-673 of the same issue, together with the several other aspects of the theory and practice of evaporation.

De-salting Sea Water

Wipers are also used in the General Electric's new, thin-film evaporator, which will, for instance, de-salt sea water at a cost of only some 40 to 60 cents per 1,000 gallons. Says the brief summary of de-salting processes on pp. 26A-28A: 'GE's basic unit consists of a 6in. diameter copper tube, 50in. tall, surrounded by a concentric steam jacket, 10in. in diameter. A wiper assembly inside the copper tube rotates at 200rpm to scrape four vertical 50in. blades against the full inside surface of the tube. Input water (saline, brackish, or otherwise polluted) enters the unit through the hollow wiper shaft. A distributor discharges this feed water just in advance of the wiper blades at the top of the tube. The water flows down the inner surface of the copper tube, and the blades spread it in a film about 0.001in. thick. This is too thin to support bubble formation, and rapid evaporation proceeds from the water layer'.

The remainder of this summary deals with other ways of de-salting: by freezing, electrodialysis, and ion exchange membranes.

A Safety Note

Lest I should lose a good story by putting it as a tailpiece, I pop in here this borrowing from *Adhesives Age* which quotes it from *By Gum*, a publication of Reichold Chemicals. A sign in a chemical plant reads: 'If you must smoke, do so — then leave by the exit that will suddenly appear in the roof'.

New Ideas

Continuing my valuable development notions, here are some more ideas picked up recently.

Rigid, cellular polyurethanes, increasingly used in constructional work, can be made self-extinguishing by the chemical 'building-in' of HET acid, chlorendic acid, which is made by reacting hexachloropentadiene with maleic anhydride. This dibasic acid contains 54.7% Cl. It is a patented development of Hooker Chemical Co. and is discussed in *I/EC*, August 1961, Vol. 53, No. 8, pp. 30A-31A.

Silicones in Space

Most American space missiles use large amounts of silicone rubbers which have now been found to be extraordinarily resistant to the very high temperatures for extremely short periods encountered on re-entry into the earth's atmosphere. An illustration in *I/EC* shows how 'a ¼in. thick rubber sheet withstands 5,000°F. flame oxy-acetylene torch while an identical flame burns through a ¼in. steel slab'.

Not only that but the text on the same page gives figures showing the remarkable insulating properties of the silicone rubbers in the same application, which means that they can be used not only for seals, joints, and gaskets, and for protecting nozzles, skirts, and bases from the rocket blast, but may yet be used for nose-cones themselves.

Polythenic Ideas

In a 'Review of New Processes' on pp. 421-4 of *l'Officiel des Matières Plastiques*, Vol. 8, No. 81, there are described 14 'Special Treatments of Polythene', the general scope of which I might indicate by some examples.

A Dow Chemical Company process proposes 'to cover polythene articles with a tightly adherent, firmly anchored coating of a resin based on a halogenated polythene'. It is claimed to be very difficult, if not impossible, to detach such a coating which is extremely impermeable and, therefore, applied to film, yields a packaging material excellent for keeping food fresh.

A patent of Du Pont claims another packaging film in which regenerated cellulose is coated, by means of a solution in toluene, with polythene containing a small proportion of cyclized rubber.

Another patent, of the Plax Company, claims the coating of polythene bottles with a 'vulcanized' mixture of polyvinyl resins (chloride, acetate, and alcohol) and urea-formaldehyde. Such a coating is impermeable to and unaffected by organic solvents. The patent notes that irradiation, by bringing about an addition polymerization, markedly improves the adhesion of the coating.

Other ideas deal with compounding to improve physical properties, transparency, permeability, and with moulding.

CHARLES JENNINGS

MEN and MATTERS

A Review of People and Events

by Peter Richards

THE Clean Air Act is producing higher and higher chimneys. When F. W. Berk and Co. Ltd. installed its new sulphuric acid plant at its Stratford, London, factory, to meet the requirements of the Act, it had to build a metal chimney 150ft. high.

Of course, the higher you go, the bigger the problem of maintenance. Appropriately enough — since it has a strong connexion with pvc through its wide range of plasticizers and stabilizers — Berk chose pvc to cut down the problem, and to avoid the heavy cost of periodic painting and the possible early replacement of upper sections exposed to acid dewpoint conditions.

The chimney was coated by Plastic Coatings Ltd., Guildford. Sections of the 2ft. 6in. dia. chimney were immersed in a tank containing a paste based on British Geon's 121 resin, thus coating both sides and flanges. When gelled, the paste forms a smooth abrasion resistant coat with good adhesion to the metal. The coat is not affected by weather and requires no form of maintenance. And being corrosion resistant, it protects the interior of the chimney from the acidic conditions of the plant.

Uprooted

In about two years' time a Coseley, Staffordshire, engineering company will pull up its roots from a site it has occupied for more than 20 years and move to a new modern factory a few miles away to help the replanning of the area.

The company, Metal Formations Ltd., has concentrated on the production of oil refinery and chemical plant and, in conjunction with larger companies and consultants, has installed it in many places. All these have been carried out in conjunction with bigger companies. Now Metal Formations has set up its own organization to design, manufacture, install and commission chemical plant in the small and medium-size range.

The company has for a long time recognized the importance of plastics in the chemical plant field. In 1957 a subsidiary, Watson Bros. (London) Ltd., formed a plastics division. This now operates as Watson Industrial Plastics Ltd., with a factory in West Bromwich, producing epoxy, furane and polyester resin glass laminated fabrications.

Killing Two Birds

Two events of considerable interest to members of the synthetic rubber industry take place on consecutive dates in London next month.

On October 3 the annual International Synthetic Rubber Dinner, organized by Rubber and Technical Press Ltd., publishers of *Rubber and Plastics Age*, will be held at the Savoy Hotel. The now almost legendary Professor Natta will receive the first International Synthetic Rubber Gold Medal Award at the dinner, tickets for which are obtainable from Gaywood House, Great Peter Street, London, S.W.1, price £2 12s. 6d. each.

On October 4, at a meeting of the Institution of the Rubber Industry to be held at the Café Royal at 6 p.m., a talk will be given by P. B. Lumb, MA, DPhilSc, of Polymer Corporation Ltd., on Cis-1,4 Polybutadiene — Its Properties and Applications.

This fortuitous arrangement means that many people from out of town will be able to kill two synthetic rubber birds with one stone — if such a metaphor can be used for what promises to be two extremely interesting evenings.

ISR Appointments

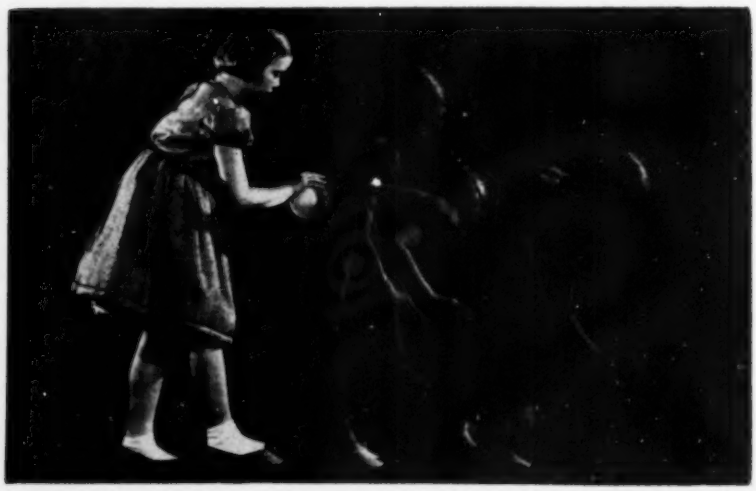
As reported in last week's issue (page 427), the International Synthetic Rubber Co. Ltd. of Hythe, Hampshire, has announced two important appointments. From October 1 K. G. Burridge will be director of research and development and K. Wyllie is works manager.

K. G. BURRIDGE

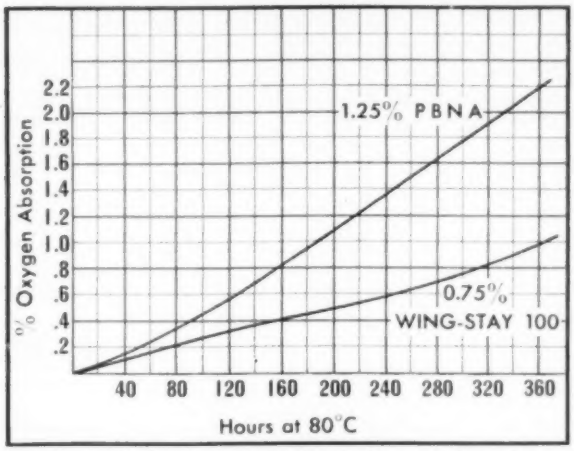
K. WYLLIE

Mr Burridge, 36, was educated at Pembroke College, Cambridge. He read chemical engineering at Brooklyn Polytechnic, USA (where he studied under Professor Mark) and, after obtaining the degree of Master of Chemical Engineering, he also gained practical experience by spending some time with instrument manufacturers, engineering contractors and at butadiene and copolymer plants.

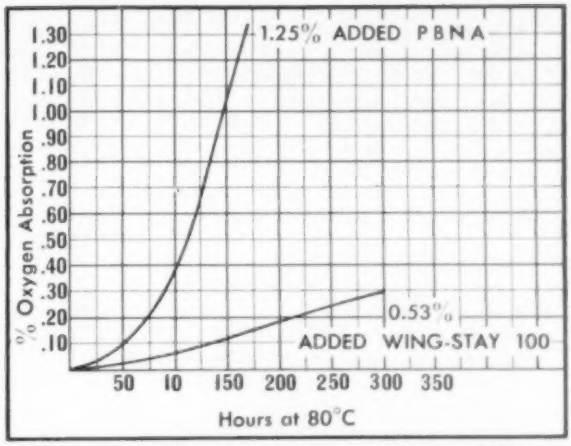
Following four years as a chemical engineering group manager he joined ISR in August 1956 as works



The ball that this little girl is bouncing provides a down-to-earth example of the shock-absorbing properties of silicone rubber. It is an egg embedded in a clear potting compound developed by General Electric for the protection of delicate electronic components in missiles and space vehicles



Effect of WING-STAY 100 on the stability of an Oil-Extended SBR Polymer.



Effect of WING-STAY 100 as added stabilizer in a "cold" nonextended SBR Polymer.

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GOODYEAR

CHEMICAL DIVISION

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Goodyear International Corporation, Chemical Div., Akron 16, Ohio, U.S.A. The Goodyear Tyre & Rubber Co. (G.B.) Ltd., Chemical Div., 8-9 Salop St., Wolverhampton

manager. During this period the plant has grown in capacity from 50,000 tons to 100,000 tons a year.

Mr Wyllie's post-graduate experience (he studied chemical engineering at London) took him overseas and, prior to joining ISR in 1957, he spent four years with Peter Spence and Sons, the chemical manufacturers.

Travelling . . .

J. P. Miln, general manager of Progress Mercantile Ltd., distributors for Pirelli resilient webbing in the UK, has left on a five weeks tour of the USA and Canada.

The purpose of his trip is to expand sales and distribution of the webbing in the North American market and to give existing distributors the latest technical information on webbing applications in the furniture and other industries.

Croxton and Garry

L. Bottomley has been appointed to the board of Croxton and Garry Ltd. as technical director. Since he joined the company in 1958 he has been instrumental in developing the use of the company's wide range of fillers and extenders for the pvc and rubber industries. Mr Bottomley was formerly with the technical departments of the Dunlop Rubber Co. Ltd. at Manchester and Walton, and the sales and applicational research departments of Monsanto Chemicals Ltd.

Appointments in Brief

BTR Industries Ltd. has appointed R. Kris manager, thermoplastics mouldings and extrusions, responsible for development of the company's business in this field. For the past four years Mr Kris has been general manager of Aeroplastics Ltd., Glasgow. Sales manager for thermoplastics mouldings and extrusions is G. G. Cope, formerly general manager of Plastic Coatings Ltd.

* * *

Norman D. Simons, of F. J. Stokes Ltd., has been appointed product specialist concerned with customers' technical problems. He has worked with Stokes machinery since January 1959, and joined Stokes' British subsidiary when it was formed this year.

THE LEGAL ANGLE

Sauce for the Gander

By a Barrister

'It is important that a small firm should have an active staff recruitment training policy. Lacking the resources of a large concern, however, it is often difficult for the small business to keep up with educational developments. . . .' — RPW, February 18 1961.

A small firm keeps hunting for and training staff, both to expand and to replace valuable employees who themselves move on and up. But have you ever wondered how the law will help you to prevent people from leaving you, in breach of their contracts of service?

We all know that employers soon get sued for wrongful dismissal if they dismiss staff without giving proper notice or salary in lieu — unless, of course, they have grounds for summary dismissal. But what about the rubber men who bounce away from their jobs, without giving the notice to which the boss is entitled? Will the Courts order them back to their desks, their machines, their laboratories? Will the law at least say that they cannot work for other outfits in the industry, during the period when they should have been labouring for their original firms? And what about damages, for not giving notice? After all, what is sauce for the goose should be for the gander. . . .

Unfortunately for employers everywhere, the law tends to favour employees rather than bosses, just as it leans towards assisting wives rather than husbands.

The only way in which a Court could force an employee who leaves his firm in breach of contract to return would be by making an order for specific performance. In other words, it would require the employee specifically to perform his contract. But as no Court could conceivably supervise the carrying out of such an order or ensure that the man really applied himself and his mind to his work if he did return, the Court will not make the order at all. It refuses to give orders that it cannot enforce. So you cannot get the man back.

Nor will it prevent him from earning his living elsewhere. It would be contrary to public policy to make a man starve, simply because he has broken a contract of service.

Worth Suing

As for damages, if you can actually prove what financial loss you suffered because the man left without giving notice, then you may find him worth suing. It is just possible, for instance, that you had no time to train a replacement for him and as a result incurred heavy training expenses. Much more likely, *you* had to work extra hours in order to make up for your missing man and to train a replacement in double-quick time. And, because you moved fast, it is likely that your company did not lose money on the deal.

'But what if you can show that during the period of notice, business fell off?'

It might have been because your executive left without giving notice — but it might also have been because there was a recession in the trade, because your order book was empty, because of a trade dispute . . . or for a hundred other reasons. And this explains why it is very seldom that an injured ex-boss recovers damages from a guilty ex-servant.

'But can you not even make some deduction from the salary the man was owed . . . or hang on to his cards. . . ?'

In both cases — no. He is entitled to his pay because he has earned it. And the cards do not belong to you — so you must give them back.

Unfair? Maybe — but it is the law. And until it is changed, it is as well that you should know it.

Rubber's Place in Canadian Industry

EXPORT DEVELOPMENT THE KEY TO PROSPERITY

THE importance of the development of export markets for Canadian-produced materials and the expansion of secondary industry in the country were stressed by E. R. Rowsee, president and managing director of Polymer Corporation, in an address to the delegates to the 44th chemical conference of the Chemical Institute of Canada, held in Montreal last month.

Canada, he said, was a growing nation. It had a wealth of natural raw materials, but because of the relatively small population, it was considered too small a market for the mass conversion of these natural resources to consumer goods. The outlook for a prosperous Canada was dependent therefore on the development of larger markets and upon the opportunities that could be provided for employment, not only in existing industries but in new industries and services which should take shape in the next decade. To meet and master this situation, he said, would require the utmost in initiative and enterprise by all Canadians, if the country were to prosper in a generally buoyant but highly competitive world economy.

Polymer an Example

Mr Rowsee said that he felt that the development and expansion of Polymer Corporation was an excellent example of what had been done to convert Canada's 'have not' position in regard to rubber into a 'have' situation, with great benefit to the country. He outlined the history of the company from its foundation during the second world war when the non-availability of natural rubber made the development of a synthetic rubber industry in North America an international necessity. After the war the decision was taken to develop the Corporation rather than write it off as a wartime expenditure. Since that time it had been an economic necessity to maintain and expand the export markets for the synthetic rubber produced at Sarnia, and this had been done to such good effect that synthetic rubber was now to be produced outside Canada by the Corporation for the first time. A speciality rubber plant was to be built at Strasburg, near the geographical centre of the Common Market, and a butyl rubber plant was to be built at a site in Europe which had not yet been decided.

Polymer Corporation had, concluded Mr Rowsee, grown in its international operations into a significant factor in the world rubber supply — a most unlikely development as viewed in 1941.

Nitrile/pvc Blends

Another paper read at the conference by a member of Polymer Corporation was one by W. J. Abrams who described developments in the use of nitrile rubber/pvc blends.

The combination of nitrile rubber with pvc, he said, produced an improved rubber to withstand severe environmental conditions.

Until this new development, nitrile rubber could resist oils, fuels and solvents, but could only poorly resist sunlight and ozone. The new nitrile rubbers had built-in resistance to sunlight and ozone and were relatively unaffected by severe environmental conditions which would rapidly degrade general purpose rubbers.

More Nitrile Outlets

This development meant that the use of nitrile could be extended beyond its present wide acceptance in oil seals and gaskets, fuel and oil hose, printing rolls and other products in contact with oils or fuels.

The improved nitrile was made by blending the rubber with pvc in amounts ranging from 20–100phr. The rubber was vulcanized as usual and the blend functioned essentially as a rubber. By proper choice of nitrile rubber, pvc and blending conditions, a rubber could be tailor-made to suit different environmental conditions.

Non-black Tyres

New advances in lignin-rubber technology were reported to the Conference by the Canadian Army's rubber and plastics chemist, Lloyd Krichew, in a paper entitled 'Lignin as a reinforcement for SBR in military pattern tyres'.

He described the use of lignin, a waste product of pulp mills, to produce a quantity of 11.00 x 20/12-ply rated nylon cord military tyres, using conventional rubber processing equipment. This was the only conventional aspect of the tyres apart from dimensions. The compounds in the carcass and tread were most unconventional, using no carbon black and only 12% natural rubber.

These lignin tyres were road tested in Texas and compared with conventional tyres under controlled test conditions. After being subjected to 15,000 miles over gravel and cross-country roads, exceptional performance results were recorded. The lignin tyres gave equivalent tread wear, based on volume of rubber lost or worn and the carcass remained intact after 100 miles of operation over terrain where no road existed. The cutting and chunking resistance was not comparable to the control tyres and means for improving this were being studied.

There was much optimism over these early successes and it was thought that completely successful lignin tyres could be manufactured in Canada, utilizing Canadian-made materials.

PLASTICS RESEARCH AT SHAWBURY Continued from page 465

problems. There must be a lead in every industry in what has been called "the new science of materials". New materials mean new qualities, new uses, new products, new markets, thus providing ever-widening fields'. He felt confident that the new laboratories and all those who worked within them would play their full part in establishing that lead in the polymer industry.

Mr Howard paid tribute to RAPRA members who had donated — or supplied at special prices — items for the extensions including pvc tiling for floors; expanded polystyrene for insulation; fittings and tubes for fluorescent lighting and plastics sinks for laboratory work.

Webbing for Beagles

Following tests with Beagle Aircraft's parent company, The Pressed Steel Co. Ltd., Pirelli webbing is now being specified for aircraft seating in the Beagle-Auster Airdale and the Auster Terrier.

Pirelli also supplies webbing for the seats of BOAC's Boeing 707 and Comet jet airliners.

PLASTICS MACHINERY DEVELOPMENTS

Packaging Machinery

VACUUM FORMING AND BLISTER PACK EQUIPMENT PROMINENT AT IPE

By JOHN SHEARING

ONE of the remarkable features of the International Packaging Exhibition at Olympia was the absence of blow moulding and injection moulding machines. However, this was outweighed by the surprising number of companies who now manufacture machines for sealing polythene.

The various machines are available in all shapes and sizes. They include those small enough and cheap enough to allow the butcher, greengrocer or grocer to have one on his counter and it will undoubtedly be a commonplace sight in future to see a shopkeeper quickly and efficiently sealing his products. Universal acceptance of this idea must increase polythene film sales enormously. It is a good example of how the machine designer can help the material salesmen. It is too often forgotten that the two go hand-in-hand.

At the other end of the scale are the semi-automatic and automatic machines designed to produce both small and large bags, flat as well as shaped.

Two other aspects of machines were obvious — at least as far as plastics are concerned. These were a number of vacuum forming and blister pack machines and much activity in the printing field. All aspects of plastics in packaging are thus being covered.

The Cheapest Machine

The smallest and cheapest machine on show was the Audion Sealboy 700, a polythene bag impulse sealer sold by **E. R. C. Robinson's Paper Co. Ltd.** At £16 5s. it must surely be one of the cheapest machines for plastics processing ever sold. It is not much bigger than a stapling machine and yet it has a sealing width of up to 8½in. It simply consists of an arm which is brought to bear on an anvil, thus trapping the edge to be sealed between. The bag is placed in, the arm brought down and held in position for half to two seconds according to the thickness of the polythene. It is as simple as that and the power consumption, at the moment of sealing only, is 110 watts!

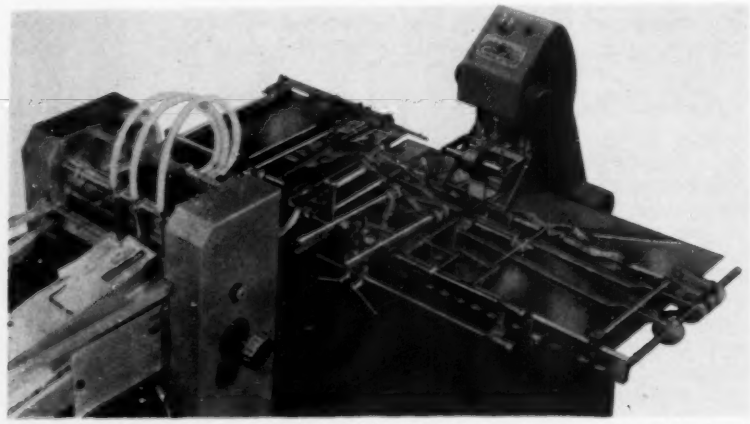
A machine of intermediate size, but much greater complexity is made by **Forsters Machine Co. Ltd.** Model PSS is a completely new development in automatic machinery, forming, filling and sealing polythene bags in one operation, on one compact mobile unit, using reel fed polythene tubing. The sizes of bags capable of being handled are 2in. to 6in. wide by 2in. to 6in. long. There are also larger models available, Model PSM making a square 5in. to 9in. wide and Model PSL a square 8in. to 12in. wide.

The rate of production is up to 25 packets per minute according to the nature of the product being fed into the bag. The machine can be manual, semi- or fully-automatic and when manual it can be run to suit the nature of the articles being fed. In operation the polythene tubing is taken off a roller, a pre-determined length is fed between two opposing vacuum jaws, each jaw being divided into two sections in its length and being operated to open and close laterally to nip the open top of the bag being formed. Above the jaws are an opposed pair of knives and an opposed sealing bar and pressure pad. All of these operate in a pre-determined cycle during which there is a pause while the bag is opened and the object to be packed placed in. The bag is sealed and the finished article delivered down a chute. Photo-electrical registration can be fitted when using printed tubing.

There were quite a number of other machines of this type which may be referred to briefly. **Edlon Machinery Ltd.** sells the Bodolay Model 34 all-purpose wrapper, capable of handling bags up to 14in. by 16½in. at a rate of 30 packages per minute. The standard machine is only semi-automatic and an operator controls the feed. However, automation can be introduced if desired and Model 34 has an attachment which gives the advantage of a gusseted bottom. This type of package is especially effective for shirts, sheets, paper napkins and the like. Other attachments include electric eye registration, electric eye quick cycling unit and magnetic counter, etc. The basic machine is in the medium price range.

Some of the most complex machines on show were the Carberts M-40 bag loader and Model 1010 bag sealer. The former automatically loads objects into bags up to 11 x 13 x 5in. at a rate of 40 packages per minute and the latter used in tandem, seals the bags. This is then a truly automatic machine, not only making the bags but filling them as well, even with quite large objects. It is naturally quite big, taking a floor space in an 'L' shaped arrangements of approximately 12ft. long x 7ft. 5in. wide.

Another firm exhibiting bag-making machinery was **Bone Brothers Ltd.**, with their Roto Poly 200 operating up to 200 cycles per minute and producing flat or gusseted bags



The Milford-Astor dry printing machine is fully automatic and will feed and print bags, sheets or cartons at a rate of 3,600 per hour. Print can be applied to many plastics including polythene, polypropylene, nylon and cellulosics

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to 16in. width and 6in. to 24in. long. There is an automatic stacker and an optional feature is a three-colour printer for simultaneous printing.

Baker Perkins

It is hardly surprising that **Baker Perkins Ltd.** in conjunction with **The Forgrove Machinery Co. Ltd.** and **Rose Brothers (Gainsborough) Ltd.** had a large stand with a number of machines on show. Their plastics equipment is well known and includes a variety of bag-making and sealing machines.

The Forgrove Flowpak machines produce a pillow-type package, that is a single web of wrapping material is formed into a tube around a folding box, the longitudinal seam is heat-sealed and the ends are crimped and heat sealed. Models 84A, 84F and 84J have maximum outputs of 200, 100 and 40 per minute respectively. The 84A and F machines are for nearly all materials which can be heat-sealed, but the 84J is normally for cellulose films only.

The TNS750 machine is, in effect, a complete packaging plant. This is because it takes a sheet of material, forms a pillow type pack, fills it and seals it. The plant may be used for all free-flowing materials including salt, frozen vegetables and sugar confectionery and the rate of output varies up to 75 packs per minute. A single production head and centralized control provides for simplicity of maintenance and the utmost convenience to the operator.

The Rose Vertical Sachet Machine, as its name implies, makes, fills and seals sachets of cellulose film, acetate film laminates to Pliofilm or heat-sealed foil taken direct from the reel. It will handle such products as shampoo, mustard, concentrated juices and hair cream and can be arranged for either single or twin filling pumps. Up to 120 sachets per minute can be produced and the maximum capacity of filling pumps is 100cc or 50cc if twin pumps are used. Photo-electric cell registration gear is a standard attachment and gives correct printing registration on both sides of the pack.

There were, of course, machines on exhibition other than bag-making types although naturally these were of the greatest importance. Vacuum forming and sealing and blister pack sealers were the most prominent and interesting.

Vacuum Pack Sealing

Mason and Morton Ltd. was showing the Vacumatic Mark IV, a new continuous vacuum pack sealing machine. There are three basic operations (a) the bags are placed into the vacuum container, (b) the filled vacuum tray moves under the fixed vacuum head and is pressed against it so that a closed chamber is formed, which is exhausted. After the bags have been sealed up in the vacuum, air is again admitted, (c) the finished bags are ejected and carried away on the built-in conveyor band.

The production rates are remarkable and in favourable cases the entire operation lasts only 3½ seconds so that 1,025 vacuum containers are processed per hour. The total output depends on the size of the bags and the skill of the operator but the maximum figures possible are 3,600 per hour for bags 1in. to 4in. wide and 1,000 per hour for bags 8¼in. to 17in. wide. Maximum length in all cases in 11in.

Control is by an electric/electronic timing device. The process is highly suitable for the vacuum packaging of such products as bacon, ham, fish, biscuits, cheese, dried fruits, tobacco and the like.

Blister Pack Unit

The **Bland** Universal Blister Pack Sealer BP1013 is a very compact self-contained machine for producing air-tight blister packs of any size or shape up to about 10in. x 13in. It is only necessary to connect it to a 50-60psi air supply and AC mains and an unskilled operator can do the rest.

The output depends on the size but the machine will effect a seal every three seconds. With the full size of pack taken up this means an output of 20 per minute, but with a small pack, which is very common, multiple sealing is possible to give say 200 per minute.

The turret operation gives a dual process of one pack being sealed and one loaded and the machine is very suitable for incorporation in a conveyor system. A size or shape change-over can be accomplished in a few minutes. The machine certainly makes blister pack packaging very simple.

Canadian Capers

The invasion from Canada at this year's exhibition also produced a versatile vacuum-forming machine capable of producing skin and blister packs or formed plastics packs at extremely high production rates. The firm was **Bata Engineering** of Batawa, Ontario, and the machine the Bata-Atlas Z-21.

A forming area for the machine of 25in. x 25in. with a maximum depth of draw of 8in. certainly lends credence to the claim that the machine is the 'most versatile in its range'. This claim is further substantiated by the production rate of 60 per minute for a skin packaging on a 5in. x 5in. card.

The machine can be supplied for either manual, semi- or fully-automatic control. Other sizes of machine are also available capable of handling packs from 14in. x 14in. up to 36in. x 36in.

Pressure Thermoforming

John Kimbell and Co. Ltd. was demonstrating its Formseal F-1 for all types of thermoplastic sheet for the production of boxes, lids, cups, inserts and blisters. The machine is completely automatic and consists of the following units: (a) sheet unwinding for sheet up to 11in. wide and 0.030in. thick; (b) heating, which is effected from both sides; (c) the forming station. Here the material is clamped (max. size of mouldings 10in. x 9½in. x 3¼in. deep) and formed by the application of air pressure which gives a more even wall than vacuum forming. Plug assisted forming can be employed where appropriate; (d) punching, trimming and discharge.

Vacuum forming can also be arranged if necessary and virtually the entire operation is carried out pneumatically. It is claimed that the machine will handle such diverse products as rigid pvc, high impact polystyrene, Polyflex, polypropylene and cellulose acetate.

The output is surprising and for a tray 2in. x 3in. x 2in. made of high impact polystyrene a figure of 100 per minute can be achieved.

Overprinting Machines

In the printing field **Milford-Astor Ltd.** was demonstrating a number of machines suitable for overprinting plastics, perhaps not so common as the well-established gravure and offset processes. This thermoprinting depends on controlled heat to apply a plastic-based colour medium to the surface which requires printing. The process is a 'dry' one and the results possible from a range of some 40 colours guarantee true matching into the original scheme. The print is indelible and can be applied to such materials as polythene, polypropylene, nylon and cellulose.

A fully-automatic machine will feed and print bags, sheets or cartons at the rate of 3,600 per hour. The machines, however, range from hand-operated types up to the fully-automatic varieties. They will print on injection or compression mouldings, either flat or shaped, extrusions, sheets, fabrics and vacuum-formed articles. Facilities are provided for feeding either individual articles or continuous rolls to the machine. The machines are likely to be very useful as the overprint cannot be distinguished from the original printing.

Plantation Newsletter

RRI ON MOLECULAR COMPLEXITY OF NR

by our Malayan Correspondent

FROM KUALA LUMPUR

MALAYANS never lose an opportunity of expressing forcefully their view that synthetic is not as good as natural. Speaking to the Malayan branch of the Institution of Rubber Industry, B. C. Sekhar, a chemist at the Rubber Research Institute here, said that rubber for manufacturing articles and other uses required essential properties as well as certain desired characteristics.

Synthetics lacked these qualities while natural had them, he said. He disclosed that recently the RRI had been engaged on research to find out the reactions of natural rubber on storage.

Natural rubber (Hevea) has been accepted to have the following structural characteristics: 1, it is a straight chain polymer of isoprene; 2, it has a cis-1,4 configuration; and 3, its average molecular weight is in the region of 1 to 2m. (*i.e.* 15,000 to 30,000 isoprene units).

But, according to Mr Sekhar, from investigations on the changes in psychio-chemical properties of natural rubber on storage, it has been discovered that some of the reactions of natural rubber were not fully consistent with these structural details.

'We had to postulate the presence of 10 to 30 aldehydic groups in the poly-isoprene chain. In other words, natural rubber is not a simple polymer of isoprene containing only carbon and hydrogen', he added.

Although it was not as yet possible to prove unequivocally using physical methods of structural analysis, the presence of these aldehydic groups, chemical reaction evidence so far obtained was overwhelming, he added.

Mr Sekhar said they had also extended this work to study the mechanism of the reaction between these abnormal groups which led to cross-linking of natural rubber on storage.

This had resulted in the discovery of 250-300 reactive sites in the poly-isoprene chain at which aldehydic groups could react. These groups could not be explained on the basis of the accepted structure of natural rubber.

Thus, it was therefore necessary to postulate that apart from 10 to 30 aldehydic groups, there were 250 to 300 of another type of abnormal group in natural rubber.

Mr Sekhar said the conclusion which must be drawn was that natural rubber was not just a simple polymer of isoprene; that it had 10 to 30 reactive groups possessing aldehydic properties; and that it had 250 to 300 abnormal groups capable of reacting with aldehydic functions.

'All these are consistent with the fact that the purest form of NR contains not only carbon and hydrogen from isoprene but also nitrogen and oxygen', he added. They had in the past attributed the presence of nitrogen to organic impurities and oxygen to oxidation.

The results they had obtained now suggested that the presence of nitrogen and oxygen may be due to the presence of abnormal groups in the polymer itself.

Mr Sekhar said that all the synthetic chemists had done was to synthesize a cis-1,4 polymer of isoprene and not natural rubber in the strict sense of the word. This, however, did not refute the claim that the cis-1,4 poly-isoprene that had been synthesized did possess the essential physical properties of natural rubber.

He agreed that all the essential properties of NR had been duplicated. But there were certain desirable characteristics of NR such as better processing, more tack, and better tear properties lacking in its synthetic counterpart.

This had been attributed to differences in molecular weight distribution, transcontent and 3,4 additions. Synthetic polymer chemists had discovered methods of controlling these. 'But one wonders whether the abnormalities in NR we have postulated influence these properties?' he asked.

Using these groups one could not produce constant plasticity rubbers in the hard or soft range. Further, these reactive groups could be used to make subtle modifications to NR, a process which was at least for the moment denied to synthetic rubber chemists, said Mr Sekhar.

Four Years Left

A spokesman for the Rubber Producers Council has said here that large-scale replanting with high-yielding material is probably the main solution to synthetic competition, but not the only solution. This was because the question of labour cost and research results too would have to be taken into consideration.

The RPC agreed with the Minister of Commerce and Industry, Inche Mohamed Khir Johari, that rubber producers had only three or four more years left before they would have to meet severe competition from synthetic.

'The natural rubber industry must be in a position to produce economically at a price which is competitive with synthetic. In time the price of natural should fall in line with synthetic', said the spokesman, making it clear, however, that the only alternative was to face the consequences, unpleasant as they may be.

Rubber Statistics

WEST GERMANY — JAPAN

WEST German rubber tyre production in July was lower than the June total but still higher than in July of last year. It totalled 18,955 tons compared with 20,719 tons in June and with 18,150 tons in July of last year, according to the Federal Bureau of Statistics. Production in the first seven months of this year totalled 136,942 tons against 132,361 tons in the corresponding period of last year.

In the individual section of West Germany's rubber tyre industry, production was (in 1,000 units, July figures provisional):

	July 1961	*June* 1961	*Jan.-July* 1961
Bicycle tyres ..	948	1,064	7,177
Motor cycle tyres	86	76	525
Car tyres ..	1,031	1,203	7,747
Lorry tyres ..	146	149	1,044

Output of other hard and soft rubber goods during July was 20,341 tons against 23,754 tons in June, and 22,265 tons in July of last year. In the first seven months of this year, it amounted to 163,552 tons against 163,384 tons in the corresponding period of last year.

Imports of natural rubber and rubber sole crepe during June totalled 10,635 tons, including 6,374 tons from Malaya, 840 tons from Ceylon, 839 tons from Thailand and 675 tons from Nigeria. In the first six months of this year, imports totalled 59,154 tons from Thailand, 4,330 tons from Nigeria, 3,674 tons from South Vietnam, 3,585 tons from Ceylon, and 3,133 tons from Indonesia.

Imports of synthetic rubber in June totalled 4,617 tons including 2,202 tons from the USA, 901 tons from Canada and 537 tons from France. In the first six months of this year, they totalled 24,600 tons including 13,641 tons from the USA, 4,927 tons from Canada, 1,967 tons from Italy and 1,907 tons from the Netherlands.

Japan

The Japanese Rubber Importers Association announced that the consumption of crude rubber in August totalled 13,500 tons compared with 14,000 tons (revised) in July. The domestic consumption of crude rubber in September has been estimated at 14,000 tons.

The end-August stocks of crude rubber were 17,880 tons.

Rubber Markets

LONDON

The main feature was purchasing of Nos. 1 and 2 RSS for September shipment and the corresponding terminal position believed to be largely against Russian account. Interest waned but covering against previous sales by dealers held the market comparatively steady at a very slightly lower level. Trade demand generally remained small.

Latest prices are as follows:

No. 1 RSS Spot: 25½d.-25⅝d.

Settlement House:

October 25⅝d.-25⅞d.
November 25⅝d.-25⅞d.
December 25⅝d.-25⅞d.
October/December 25⅝d.-25⅞d.
January/March 25⅝d.-25⅞d.
April/June 25⅝d.-25⅞d.
July/September 25½d.-25⅝d.

No. 1 RSS cif basis ports:

October 25⅝d.-25½d.
November 25⅝d.-25½d.

Godown:

October 85½ Straits cents.

Latex

Centrifuged 60% latex per gallon in drums, seller, September, October, 14s. 7d., cif European ports. Spot, seller, 15s. Bulk, seller, d.w. 14s. 6d. Normal, seller, September, October, 11s. 4d.

NEW YORK

The New York rubber market ruled as under on September 18:

Dealers' Prices

	US cents per lb., ex-dock	
	Sept. 18	Previous
No. 1 RSS, Sept. ..	30n	30n
Oct. ..	29⅝a	29⅝a
No. 2 RSS, Sept. ..	29⅜n	29⅜n
Oct. ..	29½a	29½a
No. 3 RSS, Sept. ..	29⅜n	29⅜n
Oct. ..	29⅝a	29⅝a
No. 1 RSS, Spot ..	30¼n	30¼n
No. 3 amber blanket crepe, Sept. ..	27n	27n

Futures—Rex Contract

	Sept. 18	Prev. Close
Nov. ..	29.45b–29.65a	29.50b–29.70a
Jan. ..	29.30b–29.50a	29.30b–29.45a
March ..	29.20b–29.50a	29.25b–29.45a
May ..	29.15b–29.45a	29.15b–29.45a
July ..	29.15b–29.45a	29.15b–29.45a
Sept. ..	29.15b–29.45a	29.15b–29.45a

Sales: Nil. Tendency: Quiet.

Rubber futures were steady in quiet dealings on September 18. Physical rubber was quiet.

BANGKOK

The price of No. 1 RSS at Bangkok on September 18 was 28.00 (27.75) US cents per lb.

SINGAPORE

After a few bids at around previous closing levels had been satisfied on September 18, prices declined under some selling, mainly attributed to hedging. Interest in lower sheets was small and mainly on a switching basis. Prices remained static throughout the afternoon. Little trading was done. Lower sheets were in small demand.

	Malayan cents per lb., fob Malayan ports to open ports	
	Sept. 18	Previous Close
No. 1 RSS, Oct. ..	86 –86½	86½–86⅝
Nov. ..	86½–86⅝	86⅝–87
No. 2 RSS, Oct. ..	85⅞–86	86⅛–86¼
No. 3 RSS, Oct. ..	83½–84	84¼–85
No. 4 RSS, Oct. ..	82 –82⅞	82½–83
No. 5 RSS, Oct. ..	76⅞–77⅞	77 –78
No. 1 RSS, Spot ..	85⅞–85⅞	85⅞–86⅛
No. 3 blanket thick remilled crepe, Oct.	77½–78½	78¼–79¼
No. 1 fine pale crepe, Oct.	95 –96	96¼–97¼
2X thin brown crepe, Oct.	73 –74	74¼–75¼
Tendency:	Quiet.	

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob, at 168.00d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on September 18:

	Guilders per kilo	
No. 1 RMA	Sept. 18	Previous
September ..	2.38	2.39
October ..	2.38	2.39
November ..	2.38	2.39
December ..	2.38	2.39
October/December	2.38	2.39
January	2.38	2.39

Sales: Nil. Tendency: Quiet.

DJAKARTA

	Rupiahs per kilo	
	Sept. 16	Previous
Spot No. 1 Priok ..	36.75b	36.50b
Spot No. 2 Priok ..	35.75b	35.50b
Spot No. 3 Priok ..	34.75b	34.50b
No. 1 fine pale crepe, spot	34.00b	34.00b
Tendency:	Quiet.	

CEYLON

The price of No. 1 RSS at Colombo on September 18 was 104½ (105) Ceylon cents per lb.

Calls for Tenders

Tyres and Tubes

290 rubber tyres of various type and dimension are required by the Ministry of Trade in Greece. Bids should be sent to the Offices of the Direction B State Purchases, 50 Socratous Street, 4th Floor, Athens, quoting Invitation No. B/497. Closing date: September 28 1961. (Ref. ESB/28522/61.)

CORRESPONDENCE

English and Technologists

Sir,

In his 'Views and Reviews' F. C. Jennings writes of the Borough Polytechnic that 'it gives no instruction in writing English' (*RPW*, September 16). He says the same of the Northern Polytechnic, the implication being that such instruction should be given.

These comments of Mr Jennings raise a number of interesting questions to which perhaps some of your readers can give the answers.

Should a Polytechnic be obliged to teach English students how to write English? Is this one of the purposes for which a Polytechnic exists? Should not the student have learnt how to write English before — a long time before — he starts his studies at the Polytechnic?

Can the Polytechnic not refuse to accept English students who are unable to write their own language properly — or would this mean that the number of their students would fall so low that any Polytechnic adopting this line would no longer qualify for the various grants now received?

Hoping that numerous readers will not now criticize my English.

Yours truly,

DR H. J. STERN.

London, W.6.

Columbian Research

Columbian Carbon Co. of New York, has appointed Dr C. W. Sweitzer as director of the Princeton Research Centre, K. A. Burgess as director of carbon black research, and Frank Lyon as assistant director of carbon black research.

In making these appointments, Dr C. A. Stokes, general manager of research and development for the carbon black and pigment division, stressed the importance of decentralizing product research and development so that research effort could be concentrated on each major product group by those specialists who know the field from long years of experience.

Dr Sweitzer, who will administer research on a number of product lines at Princeton, has been active for many years in research in carbon black and dispersion products.

Currently, Columbian carbon black researchers have developed two improved grades of carbon black for polybutadiene rubbers.

Industry INTELLIGENCE

Machines, Materials and Equipment

Acoustic Corona Detector

A simple instrument has been made available for testing various high voltage components under working conditions. It uses a small probe containing a vibration detector to detect the onset of a corona discharge. The probe is connected to a compact transistorized amplifier provided with a loudspeaker and an alternative stethoscope-type headset for noisy surroundings. The whole forms a compact, portable unit, independent of external power supplies, which can be used without the need to make electrical connexions or other disturbances to the component under test.

Typical uses are for tests of incipient breakdown in power cables in service; exploration by the probe will locate points at which discharges are taking place in solid dielectric, oil-filled or gas-filled cables. Tests on porcelain bushings, high voltage condensers and similar components are also possible, in which the onset of ionization is detected, and the particular point at which it occurs is located.

The technique was developed by the Research Organization of British Insulated Callender's Cables Ltd., and the instrument is manufactured by the Addison Electric Co. Ltd., 10/12 Bosworth Road, London, W.10.

Microscopy Finder

The England 'Finder' has been designed by Graticules Ltd., 57/60 Holborn Viaduct, London, E.C.1, to provide an accurate reference system whereby the user of a microscope and slide mounted specimens can be sure of easily and quickly finding the field of interest.

It consists of a glass slide, 3in. x 1in., marked with a square grid at 1mm. intervals. Each square contains a centre ring bearing a reference letter and number, the remainder of the square being subdivided into four segments, numbered 1 to 4. Reference numbers run horizontally and letters run vertically. The main locating edge is the bottom of the slide which is used in conjunction with either the left or right vertical edge of the slide, according to the fixed stop of the stage of the microscope.

After examining the specimen in the normal way and finding a point of interest, it is brought to the centre of the field of view, then, taking care not to alter the position of the fixed stops of the stage, the slide is removed and replaced by the finder.

The reference number of the main square is now recorded, followed by an oblique stroke and the number of the segment in which the centre of the field of view lies.

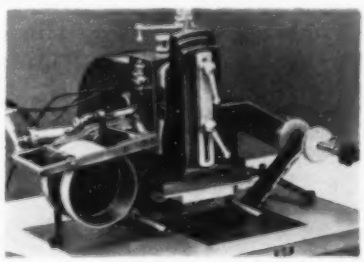
The reverse procedure is adopted when re-locating the point of interest, the finder being placed on the stage, as described above, and the stage adjusted until the appropriate reference square and segment appear in the centre of the field of view.

Gold Blocking Machine

HF Industrial Services Ltd. has produced a high frequency plastics gold blocking machine that, with fully automatic cycling, is claimed to successfully carry out either cold or hot gold blocking. The unit which will handle gold and other coloured foils, has been designed as a complete entity that can be fitted to any standard Acme table model plastics welding machine.

A single operation irons out the emboss on the base pvc and deposits the metal or coloured foil just as and where required.

Automatic cycling of the foil leaves the operator's hands free for other work and on suitable applications, 20 impressions per minute may be expected. Operation is by compressed air, requirements for which are either a small compressor or existing air supply of



14 cu. ft. per hour at maximum of 80lb. per sq. in. Further details of these Acme foil blocking machines may be obtained from the company at 317-319 High Road, Wood Green, London, N.22.

Technical Data

Croda Surfactants

The Polychols are polyoxyethylene condensation products of wool wax alcohols available in five experimental grades from Croda Ltd., Cowick Hall, Snaith, Goole, Yorkshire.

These materials are non-ionic surface active agents which can be used as emulsifiers for producing oil-in-water emulsions. They also act as solubilizers, wetting agents, dispersing and gelling agents. The Polychols also possess properties which suggest their investigation as textile auxiliaries and as anti-static agents for textiles and plastics.

The range of Croda Polychols is described in a technical data sheet available from the above address.

Acrylic Emulsions

Technical bulletins Nos. 57 and 72, recently issued by Revertex Ltd., 51-55 Strand, London, W.C.2, describe the properties and uses of some of the company's acrylic products.

Acrylic Emulsion 1A, the subject of bulletin No. 57, is an internally plasticized acrylic and methacrylic ester copolymer emulsion containing 52% solids. This has been specially designed for use in emulsion paints and is expected to have excellent durability in paints for exterior use. Provisional recommendations as a guide to the paint formulator are given in the bulletin.

Bulletin No. 72 gives uses of Reversol A/MV and Reversol N which are aqueous solutions of acrylic acid and acrylamide polymers respectively. These are used in the manufacture of pigment dispersions in emulsion paints.

Publications

Thermocouples

The Cambridge Instrument Co., 13 Grosvenor Place, London, S.W.1, has issued a new publication describing its standard range of rare- and base-metal thermocouples for temperatures up to 1,500°C. In general, these are manufactured to customers' specifications and for particular applications, but certain types of assembly which have been continuously in demand, are now produced as a standard range.

The booklet gives details of the factors governing the choice of suitable assemblies for widely differing applications, and describes a simple three-letter coding system which simplifies the ordering of stock assemblies and replacement parts.

Abrac Plasticizers

A. Boake, Roberts and Co. Ltd. has issued two new publications: technical notes on plasticizers for foamed pvc and Abrac plasticizers for pvc. The first gives the several methods for producing foamed pvc and a table gives a comparison of two important properties of, pvc compounds containing a number of different plasticizers.

The second booklet is in the form of a chart based upon the latest data available. It is provided to illustrate the comparative properties of the various plasticizers listed, under the condition of test indicated. The figures quoted are an average of results obtained with each plasticizer.

These booklets can be obtained from the company at Carpenters Road, Stratford, E.15.

IRI Golf

Scottish Section's East v West match

THE East v. West Match took place over the Dunblane Course on Saturday September 2, followed in the afternoon by a medal round for the vice-captain's prizes and second leg of the McElroy Medal.

After a fine week, the weather broke on Friday night and the match started under most depressing conditions. The rain eased by mid-morning and it remained dry until lunch-time, with the afternoon a repeat of the morning.

East: T. W. W. Davie 0; F. Middleton 0; N. Paulin 0; R. Barber 0; A. McKenzie 1; J. C. Evans 1; D. F. Valis 0; A. Dishington ½; D. McDonald 1; W. K. Relph 1; J. Dawson 0; and J. S. Wilkie 0. Total: 4½.

West: P. W. Bell 1; W. S. Alexander 1; D. Chesney 1; W. Johnston 1; A. Pratt 0; J. Campbell 0; L. Johnson 1; K. Manock ½; L. Dowsett 0; S. Jonker 0; J. M. Gallie 1; and J. M. Gallie 1. Total: 7½.

The Medal Round was closely contested with ten strokes covering the 17 players who completed the round. Leading scores: D. McDonald 81−10 71; J. M. Gallie 89−17 72; W. K. Relph 91−18 73; L. Dowsett 87−13 74; W. S. Alexander 80−6 74; and S. Jonker 97−22 75.

With the exception of Bill Alexander, the prizes donated by J. M. Gallie all went to our guests for the day. The McElroy Medal and Prize was won by J. M. Gallie with 73 and 72=145, D. Chesney (71 and 77) and S. Jonker (73 and 75) being equal second.

The fireworks conspicuously absent on the golf course were reserved for the road home — whether going east or west, the party ran into the start of the worst thunderstorm to hit the Forth Clyde Valley probably in living memory.—J.M.G.

Catamaran Challenge

A UK catamaran crew, headed by J. Fisk, of Canvey Island, is now crossing the Atlantic to compete with top US crews for the American Catamaran Challenge Cup.

Each member of the three-man crew has been provided with three pairs of Magister yachting shoes and a pair of yachting boots by the Dunlop Footwear Co.

Day-Glo

The September 2 issue of *RPW* contained a picture of a marker buoy made from seven layers of Marleycel expanded polystyrene which we stated had been painted with 'Day-Glow' paint. Dane and Co. Ltd., of Stratford, E.15, has pointed out that the name 'Day-Glo' is the registered trade mark of Switzer Bros. Inc., Cleveland, Ohio, and Dane is the registered user in the UK with the word spelt without a 'w'.

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

Owing to ever increasing production costs, the publishers of RUBBER & PLASTICS WEEKLY regret that they are compelled to make a slight increase in their charges for Classified Advertisements.

As from October 1 1961, all headings other than Auctions and Tenders will be 8d. per word. Minimum 12s. Box No. 2s. extra.

The charge for Auctions and Tenders will be 5s. 6d. per line. Minimum 38s. 6d.

APPOINTMENTS VACANT

6d. a word, Minimum 12/6 Box 2/-

ACHEMIST, experienced in rubber industry, is required for the development laboratory of a company in North London area. A flair for developing sound ideas energetically is mainly required. Salary range £900-£1,250. Candidates, over 23 years of age, should supply full details.—Box 016. (016)

A TECHNICAL REPRESENTATIVE who can read drawings, if possible with some knowledge of moulded sponge (although this is not essential) is required by a Midlands firm with an expanding business for sponge. No applicant can be considered unless he has had some years of training in a rubber factory. This is a position which would be very suitable for a comparatively young man with experience who is now desirous of taking up a permanent post with a progressive firm.—Write, in confidence, giving full details of age, experience and salary required, to Box 003. (003)

EXPERIENCED cost accountant and purchasing manager required by a progressive shoe factory in Iran. Daily production approx. 10,000 pairs of rubber and leather shoes. Good salary, bonus on the production, free housing, return ticket to UK.—Please write in full confidence to P.O. B.255, Teheran, Iran. (490)

APPOINTMENTS VACANT

MSL *have been retained to advise on this appointment.*

WORKS MANAGER

for a rubber works in the London area, making a wide range of mechanical products. He will be responsible to the Board for all aspects of production. This includes cost control, personnel and engineering. Starting salary around £3,500/£5,000 according to age and experience. Non-contributory pension scheme and car.

Candidates between 32 to 45 must have an engineering background and be fully experienced in rubber production processes. They should have an up-to-date knowledge of modern management techniques. Please send brief details, in confidence quoting reference LU.3222 to H. C. S. Brand.

In no circumstances will a candidate's identity be disclosed to our client unless he gives permission after a confidential interview at which he will be given full details of the appointment.

MANAGEMENT SELECTION LIMITED
17 Stratton Street, London, W.1

(025)

APPOINTMENTS VACANT
(continued)

DUE to considerable expansion of sponge department an experienced chemist and a technician are required to assist in development and control. Good welfare schemes and conditions.—Apply stating experience and salary required to Box 462 (462)

FOREMAN required, fully experienced in the compounding of synthetic rubbers and should have first-class knowledge of all aspects of calendering. This will be a permanent progressive position in a rapidly expanding department and the selected applicant will be responsible to the existing Departmental Superintendent. Applicants should have held a similar supervisory position and had a number of years' experience in the above processes.—Please write, giving details of age, experience, salary, etc.—Box 496. (496)

QUALIFIED experienced rubber technologist or chemist, 20-35, to take charge of control and development laboratory of a new and expanding company specialising in the manufacture of synthetic rubber products. Works situated in rural North of England. Interesting work and excellent prospects of promotion. Own staff notified of vacancy.—Write giving details of experience, etc., to Farmiloe Sealants Ltd., 88 Nine Elms Lane, London, S.W.8. (018)

WANTED, Senior or Junior Draughtsman for plant layout and maintenance work in rubber factory in Northampton area. A good salary will be offered to men having suitable experience and ability.—Apply stating full details to Long and Hambly Limited, Great Billing, Northampton. (013)

THE METAL BOX CO. LTD.

TECHNICAL ENGINEERING DIVISION

have a vacancy at their

BOREHAMWOOD, HERTS

factory

for a

PROJECT ENGINEER

in the

PLASTICS DEPARTMENT

The successful applicant will be required to assist in the design and development of original processes and machinery for use in the plastics field.

Responsibility will include initial design and progress of work through erection and commissioning stages.

Qualifications:—Thorough theoretical and practical training in Mechanical Engineering and at least 5 years' experience in project development.

This post is permanent, progressive and pensionable.

The Borehamwood factory is a modern building in pleasant surroundings and within easy travelling distance of Harrow, Watford, Enfield and St. Albans areas.

Please apply Personnel Officer, The Metal Box Co. Ltd., Chandos Road, Park Royal, London, N.W.10. (014)

APPOINTMENTS VACANT
(continued)

MANAGER required for Latex Foam Department. Write stating age, experience and salary required.—Box 026.

REQUIRED for small Rubber Service and Research Laboratory in Midlands, young semi-qualified Rubber Technologist of L.I.R.I. standard. Opportunity to acquire extensive knowledge of Acceleration of Rubber Compounds and investigation of compounding problems. Time allowed for study for Associateship. Contributory Pension Scheme. Nominal five-day week. Canteen facilities.—Apply giving details of age, education, training, qualifications and experience to Robinson Brothers Limited, Phoenix Street, West Bromwich, Staffs. (028)

APPOINTMENTS WANTED
6d. a word, Minimum 10/- Box 2/-

AMBITIOUS D.P.I., aged 21, from Public School, requires position in Plastics Industry where initiative and drive are rewarded. Willing to work anywhere, U.K. or abroad.—Box 023. (023)

CHIEF ENGINEER seeking change, rubber, plastics, wide plant knowledge, design, modernisation, costing. Highly mobile in thought. Technical, on PVC. Sound health, alert. Highest recommendation, North, South.—Box 024. (024)

FURTHER Rubber/Plastics Laboratory and/or works experience required view A.I.R.I. General rubber experience, BSc, preferably London area.—Box 029.

EXECUTIVE, qualified, early fifties, 30 years' experience, technical, production, sales. Desires change. General management. Post with medium sized company preferred.—Box 012. (012)

BUSINESS PROPOSITIONS
6d. a word, Minimum 12/6 Box 2/-

SURPLUS mixing capacity on steam heated Beken and Werner Pfleiderer type mixers available in Manchester area.—Box 027. (027)

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RUBBER & PLASTICS

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COVENTRY Climax and Conveyancer forklift trucks!!! A choice selection of electric, Butane gas, petrol and diesel models. From 2,000lbs. to 6,000lbs. capacity. 6ft. to 12ft. lifts.—Full details, photographs and prices from Speed Electrics, Dept. RJ, Church Street, Basford, Nottingham. Tel.: 75716. (017)

'COTSWOLD' dipping machines and circulating tanks for latex and PVC. New catalogues now available on request.—Lionel Hook and Sons, Ebley, Stroud, Glos. Tel.: Stonehouse 614/5. (380R)

HYDRAULIC presses, pumps, valves, new, also large second-hand stock.—Thompson and Son (Millwall) Ltd., Cuba St., London, E.14. East 1844. (427)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

PLASTIC injection moulding machine, Windsor 6oz. model SH6. Steam boilers, 200lbs. to 16,000lbs. evaporation; Economic, Cochran, Lancashire; automatic oil and stoker firing; delivery and installation anywhere. Insurance approved and 12 months' guarantee. Highest part exchange valuations.—Fred Watkins (Engineering) Ltd., Coleford, Glos. Telephone: Coleford 2271 (5 lines). (406)

WESERO Buffing Machine for disposal, as new.—Offers to Box 021. (021)

MACHINERY FOR SALE

(continued)

SHAW 60in. x 22in. mill with 100 h.p. drive. 30in. x 24in. and 21in. single geared cracker with 200 h.p. drive. Pair of 50in. x 18in. single geared mills with 140 h.p. drive. Several smaller mills.—Reed Brothers (Engineering) Ltd. (Mr. C. E. M. Hardie—Receiver and Manager), Replant Works, Woolwich Industrial Estate, London, S.E.18. Tel.: Woolwich 7611. (019)

— PHONE RAINHAM 5655 —

PRESSES - MILLS - PLATENS - ETC.

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(430)

UNUSED 60in. x 22in. single geared mixing mill, friction ratio 1.15 to 1, Vibro mounted, Lunn safety equipment, driven by 125 h.p. slip ring motor.—Box 020. (020)

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VANDYKE 6925 (739)

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6d. a word, Minimum 12/6 Box 2/-

MELLOR Equipment Ltd., Springfield Lane, Salford, 3, buy used machinery of Francis Shaw and Joseph Robinson manufacture.—Telephone Manchester, Blackfriars 1866. (428)

WANTED—One Masson Grinding Mill, must be in good condition.—Reply stating price and condition to Box 022. (022)

PREMISES FOR SALE

6d. a word, Minimum 12/6 Box 2/-

CENTRAL Hampshire. 4,500 square feet covered space and additional land approximately 105ft. x 50ft., light industrial permission applied for. Very good north to south and east to west road and rail facilities; ample labour. £16,000: or with excellent modern three-bedroomed house, having a frontage to the river Test, £21,000.—K. J. Apthorpe and Co., 12 Station Road, Aldershot, Hants. Tel.: Aldershot 22544. (015)

PLEASE NOTE

INSTRUCTIONS FOR THE CLASSIFIED ADVERTISEMENTS MUST REACH US BY 10 A.M. WEDNESDAY MORNING OF EACH WEEK

Address Box Number replies to:

Box No. —, RUBBER AND PLASTICS WEEKLY

Maclaren House, 131 Great Suffolk Street, London, S.E.1

TECHNICAL COURSES

NEWTON HEATH TECHNICAL COLLEGE MANCHESTER, 10

Principal: R. Harrison, M.A. (Ed.), B.Sc., F.R.I.C.

APPLIED SCIENCE DEPARTMENT

Head of Department: L. L. Roe, M.Sc., F.I.R.I.

A series of six Lectures on

'Modern Factices and Present Uses in the Rubber Industry'

will be given in the College on Wednesdays at 6 p.m. (followed by a period for discussion to end at 7.30 p.m. approximately). The series will be introduced at 6 p.m. on Wednesday, October 4, by

DR. W. F. WATSON

Director of Research,

Rubber and Plastics Research Association of Great Britain.

1961

Oct. 4 Historical and Economic Aspects of Factice: Mr. R. F. Reynolds (Hubron Rubber Chemicals Ltd.).

Oct. 11 Chemistry and Microscopy of Factice: Mr. A. H. Clark (FRADA Research Laboratory).

Oct. 18 The Manufacture and Testing of Factice: Mr. J. H. Carrington (Anchor Chemical Co. Ltd.).

Oct. 25 Factory Uses of Factice in Natural Rubber Compounds: Mr. J. Donnelly (British Recovered Rubber and Chemical Co. Ltd.).

Nov. 1 The Use of Factice in Synthetic Rubber Compounds other than SBR: Mr. B. Pickup (Anchor Chemicals Co. Ltd.).

Nov. 8 Factice in SBR Compounds—particularly Tyres: Dr. C. Falconer Flint (FRADA Research Laboratory).

There will be no fee for the lectures. Those wishing to attend are asked to signify their intention to the College before the date of the first lecture.

(501)

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LAMINATES · SHEET · SPONGE · STRIP

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WRITE BOX 472 (472)

PATENTS

6d. a word. Minimum £1. Box 2/-

THE proprietor of British Patent No. 695049, entitled 'Improvements in Snow and Ice Tires' offers same for licence or otherwise to ensure practical working in Great Britain. —Inquiries to Singer, Stern and Carlberg, 140 So. Dearborn Street, Chicago 3, Illinois, U.S.A. (005)

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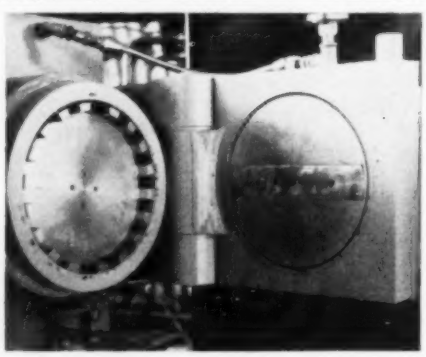

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